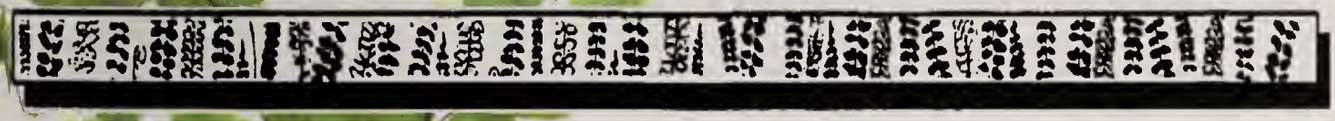
Hardy Fern Foundation Quarterly



Spring 2005

Special Publication on Hardy Garden Ferns

THE HARDY FERN FOUNDATION

P.O. Box 166

Medina, WA 98039-0166

Web site: www.hardyferns.org

The Hardy Fern Foundation was founded in 1989 to establish a comprehensive collection of the world's hardy ferns for display, testing, evaluation, public education and introduction to the gardening and horticultural community. Many rare and unusual species, hybrids and varieties are being propagated from spores and tested in selected environments for their different degrees of hardiness and ornamental garden value.

The primary fern display and test garden is located at, and in conjunction with, The Rhododendron Species Botanical Garden at the Weyerhaeuser Corporate Headquarters, in Federal Way, Washington.

Satellite fern gardens are at the Stephen Austin Arboretum, Nacogdoches, Texas, Birmingham Botanical Gardens, Birmingham, Alabama, California State University at Sacramento, Sacramento, California, Coastal Maine Botanical Garden, Boothbay, Maine, Dallas Arboretum, Dallas, Texas, Denver Botanic Gardens. Denver, Colorado, Georgeson Botanical Garden, University of Alaska, Fairbanks, Alaska, Harry P. Leu Garden, Orlando, Florida, Inniswood Metro Gardens, Columbus, Ohio, Lewis Ginter Botanical Garden, Richmond, Virginia, New York Botanical Garden, Bronx, New York, and Strybing Arboretum, San Francisco, California.

The fern display gardens are at Bainbridge Island Library, Bainbridge Island, WA, Lakewold, Tacoma, Washington, Les Jardins de Metis, Quebec, Canada, Rotary Gardens, Janesville, WI, University of Northern Colorado, Greeley, Colorado, and Whitehall Historic Home and Garden, Louisville, KY.

Hardy Fern Foundation members participate in a spore exchange, receive a quarterly newsletter and have first access to ferns as they are ready for distribution.

Cover Design by Willanna Bradner

HARDY FERN FOUNDATION QUARTERLY

THE HARDY FERN FOUNDATION

SPECIAL ISSUE ON

HARDY GARDEN FERNS

Volume 15 • No. 2 • Editor - Sue Olsen
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The Hardy Fern Foundation Spring 2005 Quarterly is a special issue on hardy garden ferns featuring personal evaluations and recommendations for using ferns in assorted climates and exposures throughout the country.

President's Message - Spring 2005

This last weekend of March greets us with a much needed good rain, after a mild but unusually dry winter here in Pacific Northwest. Everything is two weeks early as pertaining to growth initiation and bloom. *Polystichum polyblepharum* has unfurled with just that last quarter of the fronds limp and not yet fully extended. The wiry stipes emerging and unfurling fronds of *Adiantum aleuticum* are six inches above the ground. *Athyrium niponicum* 'Pictum' croziers are just beginning to awaken. *Woodwardia unigemmata* with its dark blood red gangly fronds is arching outward, the pinnae still partially curled.

This large edition of the spring quarterly presents a significant amount of information on what ferns are hardy and garden worthy in various regions of North America. Most of the information gathered and assembled here is from HFF members. We, HFF board members, have come to the realization that our members offer one of our most valuable sources of information with evaluations and pertinent fern data. Members are fern enthusiasts who are not only growing an assortment of ferns, but are more likely to try new species and varieties, and then make the time to tend, observe, record, and disseminate the information gathered. Many thanks to our contributors to this issue from across the country, Ralph Archer, Nick Donnelly, Mark Dwyer, J. Kendall Few, Joan Gottlieb, Robin Halley, Jim Horrocks and Pat Kennar. And a big Thank You to our editor Sue Olsen and her assistants, Michelle Bundy, Willanna Bradner and Karie Hess, for putting together this wonderful informational issue. Take a moment to read a description, which is located on the inside front page of the quarterly, of HFF and the purpose for it's establishment. This issue is a wonderful tool in providing information on what ferns are growing where and how they are performing. As more newly introduced ferns species and varieties are grown and evaluated in various regions of the continent, a greater number of ferns will become available to the general gardening public.

The HFF future committee has recommended to the board, to significantly upgrade and expand the HFF website. By using the website not only as a source of information, it will also be designed to be more inter-active and user friendly. New information can be collected, assessed and then be made available to all users of the website. Thank You, Board Member Bors Vesterby in leading this important work on the website.

Board Member/President Elect Richie Steffen has just returned from a plant exploration trip to Chile, and he has bought back spores from many fern specimens. We are looking forward to testing and evaluating ferns from this region of the world. Considering geographical similarities to the west coast of North America, it is believed that there are many species that will do well here.

Fern books and information that have been a part of the HFF collection for years have been donated to the Elisabeth C. Miller Horticultural Library at the University of Washington. This collection contains over one hundred volumes and numerous articles and documents on ferns and fern gardening. Thank You Sylvia Duryee and Jocelyn Horder, for your generosity and time in making this wonderful contribution possible.

This past February, HFF again set up an educational booth at the Northwest Flower and Garden Show. Large established fern specimens, a brightly colored table and chairs, along with gorgeous photos of ferns, adorned the booth. Thanks Michelle Bundy and Becky Reimer for the design and set up of this wonderful booth. Numerous visitors were drawn to the booth, expressing a growing interest in ferns and fern gardening. A Thank You to Richie Steffen who gave an excellent presentation on ferns accompanied with gorgeous slides to a packed (300 +) lecture room of fern enthusiasts.

This years Fern Festival will be held on June third and fourth at the Center for Urban Horticultural at the University of Washington. We are preparing for another great festival that could rival the 2004 festival. Numerous species and varieties will be available for sale, including a large number of specimen size plants. Richie Steffen will be our guest speaker and will give a presentation, "The Roving Botanist's Guide to Chile", along with slides detailing his recent trip. The lecture will be Friday evening about 7 p.m. following the HFF Annual Meeting.

Last month, Michelle Bundy and I went down to Russell Graham's Nursery near Salem, Oregon to pick up some two hundred specimen sized ferns that will be available for purchase at the upcoming Fern Festival. Making good traveling time we arrived in late morning at this upper hillside nursery overlooking the expansive, rolling, east plain of the Willamette Valley. The view was like a scene out of a Grant Wood painting, surreal, mystic, and beautiful. To our surprise Russ had all the ferns dug, trimmed, packaged and ready to load which took us only a few minutes. Great! We had plenty of time to walk around and see the nursery. Russ grows a number of wonderful plants, many of them woodlanders, but his vast collections of hellebores and ferns were truly impressive. The planting area is arranged in rectangular beds that flow down a long sloping wooded hillside lightly treed with predominantly Garry Oak, and Douglas Fir. The soil has the typical red color of the Willamette red clay, but the soil was friable due to the repeated additions of organic matter through the years. We walked up to the top of the slope which has a nice sizeable irrigation pond which was fed by a pipe on the opposite side, probably fed from an upper hillside spring. Looking down the slope presented an array of color from the numerous beds of hellebores in full bloom in colors from white to yellow and pink, purples to almost black, with all intermediate shades of these colors added in. Beds of various ferns were intermingled with beds of hellebores and numerous other plants as we walked down the slope. We took a good look at a bed of supposedly *Polystichum polyblepharum* that was much more vigorous and upright than the type. It may soon have a varietal designation. During this time Russ was attending not only to us but also to the customers who had come to buy hellebores that were potted up and arranged on tables. Michelle and I both bought a few choice hellebores, said our good byes and headed back to Washington with memories of the enchanted hillside nursery dancing in our minds.

May this message find you in good health and spirits. Happy fern gardening.

Best regards,

John van den Meerendonk

Hardy Ferns in Southern California

Robin Halley, La Jolla, California

There is a great deal of opinion in San Diego that hardy ferns just won't grow here. But, I'm here to say that's just not true. Now I have to admit that, when I first thought about this article, I only thought about the Japanese and British hardy ferns that we tend to focus on here when we think of hardy ferns. I sort of ignored the American natives that will winter through a freeze.

I have bought a lot of ferns from my northwest hardy fern contacts (Foliage Gardens and Fancy Fronds) and I have killed a lot of hardy ferns. There do seem to be some hardy ferns that just don't persist here in coastal Southern California where the wintertime temperatures very seldom dip below 40 degrees Fahrenheit. *Blechnum spicant, Blechnum penna marina*, and *Polystichum acrostichoides* all seem to slowly desist over a period of three or so years until one day they are no more.

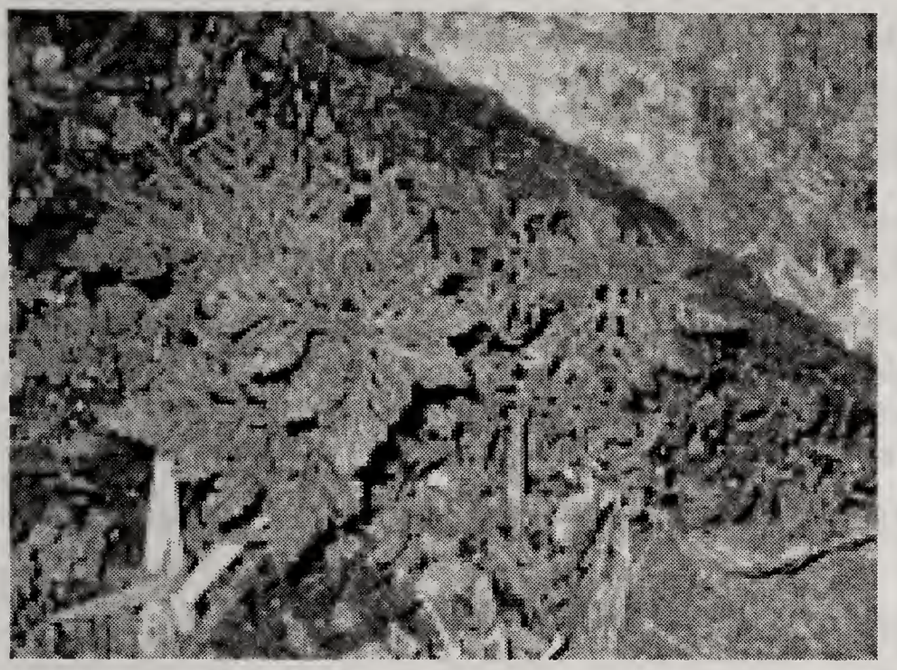
However, I have had good success with some hardy ferns. It must be said that one secret seems to be to grow the ferns in the ground. In pots, the ferns' life spans are greatly foreshortened. However, in the ground I have a variety of hardy/deciduous ferns that have lived for a decade of more. Two Athyriums (*A. otophorum,* and *A. niponicum* 'Pictum') do well here. Completely deciduous even in the Southern California sun belt, they have come up every year for nearly a decade. I also have good luck with *Dryopteris affinis* with a big beauty of the species that grows fronds up to three feet long.

Other happy typical hardy ferns here include *Dryopteris filix-mas* 'Linearis Polydactyla,' *Osmunda cinnamomea, Polystichum setiferum, Athyrium filix-femina, Athyrium filix-femina* 'Frizelliae,' *Dryopteris erythrosora, Polypodium glycyrrhiza,* and *Dryopteris filix-mas* 'Barnesii.'

Over the years I have also invoked my passion for American native plants and have a variety of natives that grow in habitats that can freeze during the winter. Chief amongst these are a variety of xeric ferns from all over the southwestern United States. Mount Lemmon in Tucson gets to over 9000 feet and freezes for some part of the winter down to nearly 5000 feet. Yet, there are quite a variety of ferns from that habitat that grow well here. There are a couple kinds of *Astrolepis* (Star Cloak Fern), some *Notholaena* (Cloak Fern), *Bommeria hispida,* and several varieties of *Cheilanthes* including *C. lindheimeri* and *C. tomentosa.*

From other mountainous areas of Arizona I am growing other ferns that live in the hardy range. These include *Asplenium resiliens, Cheilanthes villosa*, and *Cheilanthes bonariensis.* From the San Diego mountains and desert, I grow *Cheilanthes covillei, Cheilanthes clevelandii, Cystopteris fragilis, Notholaena californica, Pellaea mucronata,* and *Pellaea andromedifolia.* Finally, I also have *Adiantum* x *tracyi* (*A. aleuticum* hybrid with *A. jordanii*) and *Selaginella bigelovii.*

The horticultural secret here seems to be to ensure that the hardy ferns are in very well draining soil. Because we don't get the really cold temperatures, we normally get only a little rain (average 10 inches per year), and the fact that I grow a lot of temperate and semi-tropical ferns outside during the winter, I have to water regularly. If the soil doesn't drain well, the hardy ferns (many of which are nearly dormant or are deciduous) will rot over the winter.



Bommeria hispida,
Photo by Robin Halley

Growing Ferns in the Pacific Northwest (Puget Sound Area)

Patrick D. Kennar, 9849 NE 21st, Bellevue, WA

The northwest coastal and Puget Sound area of Washington State is blessed with a fairly ideal ecological setting for our native and exotic hardy species ferns in U.S.D.A. Zones 7-8. East of the Cascade Mountain Range, a cooler, dryer climate prevails in U.S.D.A. Zones 5-6.

With an annual average rainfall of 35 to 40 inches, we are fortunate to be able to limit irrigation or sprinkling to a couple of months and in some cases less, depending on the nature of the soil.

It has always puzzled me why hardy native ferns such as *Cryptogramma acrostichoides, Polystichum lemmonii, P. lonchitis,* or *P. scopulimm* do well in their natural settings, but seem to struggle when planted in my garden, never achieving their original and typical forms. Perhaps, a heavy snow pack provides a blanket of protection from the continuous cold and drying winds, soil dehydration, and the raising or elevating by frost that disturbs surface roots and crown structures? This, of course, is based on probability, logic and supposition rather than scientific fact.

Our yard occupies approximately 13,000 square feet and is mostly level with partial to deep shade. We have three distinct areas, which differ in soil type, tree cover and exposure.

A small "Woodland Garden" with 50-year-old cedar and white fir trees occupies one corner of the frond yard. The soil is rather sandy and as you may anticipate, root competition is a problem. Rhododendrons seem to do well and with soil amendment, a number of the following ferns thrive.

Among the best, *Adiantum pedatum* (one of my favorites) is a strong performer, reaching heights of 30 inches and remaining green through most of the winter.

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Growing Ferns in the Pacific Northwest *continued from page 5*

Adiantum venustum is a strong spreader with vigorous green arching fronds covering an area of five feet. I really like this fern and cannot seem to get enough of it.

Arachniodes cavalerii is next to the foundation and adequately moist. It reaches a height of 24 inches but is slow to come out in the spring.

Dryopteris crassirhizoma after four years has developed a small trunk-like crown and exceeds three feet in height. I have noticed in the past couple of years, that a few of the fronds have developed a blunted or truncated tip. This is, probably, due to a lack of adequate moisture at the time of frond unfurling.

Dryopteris expansa produces healthy fronds with a trunk-like crown and a spreading fountain of growth.

Dryopteris erythrosora stands out as the showiest with unusually brilliant pink and bronze emerging fronds in the spring. Its close proximity to a large cedar tree creates some stress for water and nutrition.

Woodwardia fimbriata is reputed to be somewhat tender, however, adequate moisture and closeness to a furnace vent, moderates the effects of winter. I am very fond of this fern and marvel at the four plus feet thickset growth pattern. It requires only slight trimming of the old fronds to keep the appearance bright and green.

The following do moderately well to somewhat disappointing –

Athyrium filix-femina 'Frizelliae', *A. f.f.* x *niponicum* 'Pictum' and *A. f.f.* 'Vernoniae' appear undersized, are not particularly vigorous and seem to dry or wither easily. Competition for moisture is to blame.

Blechnum spicant is in the same category.

Dryopteris formosana, D. nipponensis, and *D. tokyoensis* appear to remain undersized and non vigorous in growth. *Dryopteris wallichiana* (does better in my back yard) seems smaller every year in this competitive location.

Matteuccia struthiopteris, Osmunda regalis, and *Polystichum setiferum* 'Rotundatum' all suffer from the above.

As much as we enjoy our "Woodland Garden", the feeling of resignation has taught us to not expect great results from some plants.

A wooded back yard with a rocky dry streambed or scree makes up the bulk of our lot (7,200 square feet). This second major area is mostly shady with large western hemlocks, (*Tsuga heterophylla*) and Douglas firs (*Pseudotsuga menziesii*) with trunks to 30 inches in diameter. The understory features a wide variety of Japanese maple cultivars that provide dappled shade. The soil here, likewise, is quite sandy, however, the accumulation of "duff" over the years, plus additional mulching and the installation of a sprinkler system, has made growing conditions quite acceptable. There is definitely, a "deep woods" feel to this locality. Interlacing paths allow good access to the plants and because of the protective cover, I would consider this area a true Zone 8.

Throughout this area of dappled shade, we have an assortment of the following ferns spread around rocks and the bases of trees.

Athyrium niponicum 'Branford Beauty',

A. niponicum 'Pictum' and *Athyrium* 'Ghost' are especially showy all summer.

Dryopteris species and varieties that have performed extremely well, with great color and form include *Dryopteris affinis* 'Congesta Cristata',

Dryopteris affinis 'Rumpelstiltskin' with a large crown, and 36-inch fronds,

Dryopteris blanfordii,

Dryopteris celsa with nice dark green, pointed fronds,

Dryopteris championii that is late to come out with its lovely light green color,

Dryopteris crispifolia, a very interesting fern that appears to wash out of color with too much sun,

Dryopteris cycadina, large with a nice display of black scales,

Dryopteris dilatata 'Crispa Whiteside', a consistently good performer,

Dryopteris dilatata 'Jimmy Dyce' dark green and compact,

Dryopteris erythrosora always a nice display of color,

Dryopteris expansa large and very graceful, and

Dryopteris goldiana large and dominant if slugs leave it alone.

Dryopteris koidzumiana and *D. lepidopoda* are extremely showy but tend to be late arriving.

Dryopteris polylepis, one of my favorite ferns, produces fronds over 24 inches long with deep black scales. It is a nice companion to the dwarf Japanese maple, *Acer palmatum* 'Ukigumo'

Dryopteris scottii does well in this Zone 8 situation and remains evergreen through the winter, slugs not withstanding.

Dryopteris sieboldii is a very unusual fern, almost unfernlike

Dryopteris spinulosa is a very complementary 'subshrub' for the deep woods setting.

Dryopteris wallichiana is truly majestic with four-foot fronds, erect and evergreen in this location.

Gymnocarpium dryopteris and *G. d.* 'Plumosum' are extremely effective as a ground covering underplanting.

Matteuccia struthiopteris is criticized by some as too aggressive. For me, they are spectacular and refreshing, especially in early spring. I have them surrounded by hellebores – an outstanding combination.

Polystichum acrostichoides. I have only one, but it does well in a rocky setting with plenty of moisture.

Polystichum mayebarae and *P. neolobatum* do well with the latter being twice as large.

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Growing Ferns in the Pacific Northwest *continued from page 7*

Polystichum polyblepharum is always reliable and glossy when enough moisture is provided.

Meandering through the above woodland setting, a dry stream bed/scree provides an interesting setting for the following:

Adiantum aleuticum (could be *A. pedatum*) is right at home by a stone footbridge.

Blechnum penna-marina is at home in an area of some morning sun, spreading over an area of six feet.

Polystichum retrosopaleaceum, probably my all time favorite, has a prominent position next to the above bridge. The early frond unfurling draws one's attention.

Polystichum setiferum vars. 'Bevis', 'Linearis', 'Plumosum Densum', 'Plumoso-Multilobum', 'Rotundatum Cristatum' and 'Setoso Congestum' all seem to be in ideal locations with some morning sun, dappled shade and moisture.

Woodwardia unigemmata is an extremely handsome fern when given its most needed moisture. I do not think my plant is the best, but what it has in the way of bright colored fronds is most rewarding.

A small special limestone rock garden provides a welcome and suitable growing location for a group of *Asplenium trichomanes*, *A. t.* 'Incisum', *A. t.* 'Cristatum' and *A. viride*. Because of the well drained, limey soil, all seem to be well formed and vigorous.

Blechnum spicant and var. 'Redwood Giant' have fertile fronds up to 24 inches high. However, I don't notice that much difference between the two.

Cyrtomium falcatum, *C. f.* 'Eco Korean Jade', *C. f.* 'Rochfordianum' and *C. macrophyllum* grow well in the vicinity of a small rock garden near a path where the sun is only present in the morning hours.

Ten years ago, I constructed an artificial bog or fen so my royal ferns would have a satisfactory home. I excavated a trench three feet deep and varying from three to four feet in width. A plastic pond liner was used to provide an internal seal and it was filled with well-rotted compost (Cedar Grove Compost, from our local, municipal recycling program) and then completely filled with water. For ten years this bog has supported the most spectacular specimens of the following:

Osmunda cinnamomea with fronds to four feet, *Osmunda regalis*, with fronds to six feet or taller and *Osmunda regalis* 'Purpurascens' which is especially outstanding at five feet high and wide. This artificial peat bed remains moist by natural run off and surface watering from my automatic sprinkler system. After ten years, I'm sure that the substrate is root bound, but it doesn't seem to make any difference. *Onoclea sensibilis* maintains its presence by colonizing freely between the other plants. This is a true success story of the right plant in the right place.

Special pairings of some ferns as understory companions create an attractive visual impression. *Polystichum setiferum* 'Linearis' at the base of the thread leaf maple *Acer palmatum* 'Koto-no-ito', a drift of *Dryopteris erythrosora* with *Acer palmatum* 'Fireglow' and *Dryopteris koidzumiana* with *Acer palmatum* 'Sango kaku' are a few examples of how plants can complement each other.

A small rock garden in a sheltered location (partially under a deck) provides a space for those ferns more suited to dry conditions. Large flat rocks protect roots of *Cheilanthes lanosa, lendigera* and *sinuata* (*Astrolepis sinuata*) growing in well-drained soil. With an overhead shield from rain, these ferns appear to be happy. I have not been consistently successful with *Cheilanthes argentea* or *Ceterach officinarum* and I don't know why. A good guess would be due to our cold, soggy winters.

A number of the following genera do quite well in containers with some of the dwarf Japanese maples.

Dryopteris dilatata 'Jimmy Dyce' is dark green and nicely compact.

Dryopteris erythrosora has color tone interest.

Dryopteris koidzumiana is late to unfurl but well worth the wait.

Dryopteris lepidopoda is nicely arching with interesting texture.

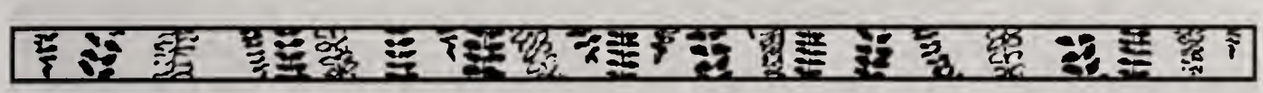
Polystichum setiferum 'Plumosum Densum' is a compact form that goes well with bonsai.

Pyrrosia sheareri looks nice with *Acer palmatum* seedlings amidst a grouping of *Adiantum venustum.*

Containers offer advantages in giving the grower a choice of where they perform well and look their best.

Spring is the most enjoyable time for me as new fronds are opening and giving our yard a fresh new look. Some years we notice a fern that stands out more than before and I don't mean to diminish the impact of our all-present native *Polystichum munitum,* a species I sometimes take for granted. It really is a wonderful fern for a foundation plant.

As one can see, our yard is bulging at the seams with plants and in addition to enjoying the ferns we are surrounded with a pleasing and ornamental array of hostas, asarums, and many other shade-loving plants.



Growing Ferns in a Cold Climate

T.W. Donnelly, 2091 Partridge Lane, Binghamton NY

tdonelly@binghamton.edu

I was introduced to ferns in 1948, when I worked at the Audubon Summer Camp on the coast of Maine. Farida Wiley, of the American Museum of Natural History, was the botany instructor, and her enthusiasm for ferns stayed with me. (She later became more widely known from E.B. White's accounts in the New Yorker of the annual warbler walks she led in Central Park.) I used her little orange fern guide exclusively for several years and still refer to it from time to time.

It was 20 more years before I started my own fern garden. The hills above Binghamton, New York, are lovely, but not very promising for any sort of gardening. At 1300 feet elevation, we straddle the border between USDA zones 4 and 5. Our native soil is possibly the worst soil in the US: glacial till with its thin organic layer almost absent as the result of decades of sheep farming in the 1800's. This soil is clay, studded with angular sandstone blocks, forcing one to dig with a mattock and lots of cold beer. In order to grow anything (my wife Ailsa is an enthusiastic and successful perennial gardener) we had to virtually manufacture our soil. For this I mixed in shredded maple bark (which is available from the local hardwood industries) and abundant garden and leaf compost. It took several years for a decent soil to develop in our gardens. I mulch annually, using shredded maple bark passed through a half-inch sieve (the coarse goes on to the paths). I use some cow manure to enrich the soil, remembering that Farida Wiley once showed me three species of ***Dryopteris*** growing beneath a heron colony on the coast of Maine. I have never since seen such giant fronds; ferns really do respond to natural fertilizers!

Dryopteris collection. Photo by T.W. Donnelly.

Our backyard has a wooded rear area about 100 by 60 feet, extending into a formerly vast woodland which has since become fragmented by suburban development. Our trees are mainly about a hundred years old and consist of red, white, and chestnut oaks, red and sugar maples, ash, hemlock and white pine, with smaller hop hornbeam. When we arrived in 1966 there were very few wild flowers and several ferns: Christmas fern *(**Polystichum acrostichoides**)*, maidenhair *(**Adiantum pedatum**)*, and lady fern *(**Athyrium angustum*** "rubellum"*)*. One of the latter profited for several years from the attentions of the neighborhood dog pack, which filed past it several times daily, the dogs peeing seriatim on the grateful fern.

In 1968 I noticed surveying marks throughout the woodland behind our house. Asking around, I quickly discovered that an upscale subdivision was planned, and the marks showed where the roads were to be located. I quickly decided to beat the bulldozer by transporting many of the imperiled ferns to my garden. Every evening I brought in mainly ***Polystichum acrostichoides***, ***Dryopteris intermedia***, and ***D. marginalis***, but also some ***Adiantum pedatum*** and ***Osmunda claytoniana***. From nearby river banks and swamps I added a few ***Matteuccia struthiopteris*** and ***Osmunda cinnamonea*** into a damp woodland seepage. (Bit of local trivia: "Chenango" is the Mohawk word for "fern", probably referring to the ostrich fern.) All of these flourished. The Christmas fern is tolerant to full sun and became the landscaping fern of choice around trees and along garden borders. Of the hundred or so I planted, I was later able to give many healthy divisions to friends. The Ostrich fern was so vigorous that I sometimes regretted having introduced it. But it is a superb fern next to the house foundation. It is also very hardy; in one case a length of stolon laid bare during concrete pouring (with about five feet exposed to the cement liquor) survived the highly caustic liquid.

A friend with a rural property brought me my first ***Dryopteris goldiana*** in 1975 when he and his wife came to dinner. Better yet, he invited to come to his property to obtain more, which I enthusiastically did. I introduced ***Dryopteris X boottii***, ***D. carthusiana***, and ***clintoniana***, the two ***Phegopteris*** species, ***Deparia acrostichoides***, and the lovely ***Gymnocarpium dryopteris***. My favorite local introduction was ***Diplazium pycnocarpon***, which makes a lovely, eye-catching patch along a path. All of these were successful, but I found that the transplanted ferns required a little more light and a little less moisture than their native sites.

Not all native ferns grow well here; a few grape ferns (I tend to find these in places where they have unwisely decided to grow – such as in the middle of well trodden paths) have failed quickly. Some walking ferns a graduate student brought me from his field area were consumed immediately by slugs. I have no hand for rock ferns, but I have established ***Asplenium trichomanes*** in the soil. All three ***Osmunda*** species do well, but the ***O. regalis*** are never as large as the wild ones in the wooded swamps. The local ***Dryopteris*** tend to be successful. Such failures as I have had are attributable to insufficiently large holes prepared for the plants. It is difficult to dig a bushel-basket sized hole amid the tree roots, and a head-sized hole is probably too small. But almost all ***D. intermedia*** have flourished, and about two-thirds of the ***D. marginalis*** (which is the dominant species further north where the soils are much limier). ***D. cristata*** grows somewhat grudgingly in my wetter places, but the ***X boottii*** with it seems to flourish.

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Growing Ferns in a Cold Climate *continued from page 11*

In 1988 I decided to try a few commercial, exotic ferns. My first plants were from a well-known flower dealer, and the plants arrived with very small, partially dried root balls. They survived, however, and I still enjoy the *Athyrium niponicum* **'Pictum'**, *Dryopteris erythrosora,* and *Polystichum setiferum* **'Divisilobum'**. In 1994 I started purchasing from three fern dealers, who provide much healthier plants, most of which have thrived. Judging hardiness has been the major problem here. Not too many people seem to grow exotic ferns in this cold climate, and information from dealers and books is not really adequate. In the following listing I have decided to rank the exotics in order of their success, which is a combination of their hardiness and my judgment of their beauty.

Dryopteris crassirhizoma. My favorite fern grows vigorously, with fronds reaching three feet (which is nearly as large as Seattle specimens). Its lovely symmetry makes it a focal point in select spots in the rear of the garden. This is one of the earliest ferns to appear in the spring, and does not crisp up in the dry late summer.

Dryopteris oligodonta. My second favorite fern was purchased in 1999 as *D. odontaloma;* I re-identified it using the description of Hoshizaki and Wilson (Fiddlehead Forum 2003, 30-2 p.9). This fern is very vigorous, with fronds well over three feet in length. In contrast to the prim ***crassirhizoma,*** this fern is a sprawling brute, and the two fern species about eight feet apart present a delightful contrast.

Polystichum setiferum. I have planted these over several years, and most have thrived. I have both the species, and the variety **'Divisilobum'**, which is somewhat less vigorous here than the species. This fern makes a lovely, low plant, in contrast with some of the taller *Dryopteris.* A few have done exceptionally well, with two-foot fronds. I confess that I can't always distinguish the two forms.

Dryopteris affinis. The species type of this fern is a truly lovely plant, especially in the early spring when its golden brown, scaly fiddleheads appear. It is sufficiently tall to require a place in the back of the beds, where it cohabits with *Osmunda claytoniana.*

Phegopteris decursive-pinnata was introduced ten years ago, and has proven especially successful here. My son grows it in Austin, Texas, but it does not seem to flourish down there. It is especially attractive because of its vertical foot-and-a-half fronds, which form clumpy upright masses utterly unlike any other of my ferns.

Polystichum makinoi. This is a very early fern, and it is commonly nipped by late spring frost. But it always comes back and presents a lovely contrast with the other polystichums with which it is planted: *P. setiferum, P. polyblepharum,* and *P. neolobatum.*

Polystichum neolobatum was first tried in 1996. Its almost holly-like, hard pinnae are extremely attractive.

Polystichum polyblepharum, first introduced in 1995, requires a moist habitat. I planted it first at the end of a drainage pipe from a rock garden, and it has flourished here along with some *Osmunda cinnamonea.* The characteristically droopy fiddleheads are especially attractive.

Polystichum braunii. This fern is native in the nearby Catskills, so it isn't all that exotic. Its lovely symmetry and hardiness makes it a desirable addition to the beds. It

presents a striking contrast to adjacent clumps of ***Adiantum pedatum.***

Dryopteris lacera is an early spring fern that looks like a miniature ***D. crassirhizoma.*** The two present an eye-catching Mutt-and-Jeff appearance in our garden.

Polystichum tsus-simense came to me as a gift in 2001 from a dealer. Because of our bitter winters, I would not have tried it on my own (The article by Horrocks: Hardy Fern Foundation Quarterly, 2002, 12-2 p. 44, hadn't yet appeared.) It is very successful as a small, eye-catching, nearly perfect fern near the back porch. I bring it in for the winter, keeping it in a 23-gallon hexagonal aquarium that seems to have been especially designed for ferns. Even if it could survive outdoors, I prefer to enjoy its beauty indoors during the dreary winter months. (Even now I am looking at it silhouetted against blowing snow.) For trivia buffs, the island from which it received its name also bears the name of one of the world's most decisive naval engagements, precisely a century ago.

Adiantum venustum seems to thrive in several places in the front of the garden. I have not discovered its favorite growing conditions; some divisions have prospered, but others have not.

Dryopteris celsa. There are natives of this species west of Binghamton, but I treat this southern fern as an exotic also. It is one of the loveliest ***Dryopteris*** in my garden, but it is considered especially delicious by the local slugs. By mid summer it has put out some durable fronds, but there is always heavy damage in the spring. ***Dryopteris X australis*** is similarly lovely and vigorous, but shares with its close relative ***D. celsa*** an attractiveness for local slugs.

Athyrium niponicum **'Pictum'** is a very successful fern for focal points along my woodland path. It is very durable; the 16-year old original plant has produced several divisions over the years.

Gymnocarpium dryopteris **'Plumosum'** has proven much hardier than the native species. I haven't really made proper use of it as a landscape plant because it tends to spread too close to several larger ferns.

Athyrium filix-femina **'Frizelliae'** and **'Victoriae'** are successful novelty ferns. They are vigorous here and never fail to attract visitors. "What in earth is that?" is the usual reaction.

Dryopteris filix-mas **'Barnesii'** is a successful, if somewhat anorexic, fern. Its symmetrical three-foot, thin fronds look nice next to thick maple trunks.

Dryopteris pseudo-mas was purchased in 1990 from a local perennial dealer, who labeled it "hardy fern – ***Dryopteris pseudo-mas***". (*Name has since changed....ed*). I doubted the identification but liked the plant. When I later added ***D. affinis***, I could see the difference, and I have come to accept the original identification. In contrast to ***D. affinis***, it is less symmetrical and almost sprawling.

Dryopteris erythrosora is pretty but does not seem to really flourish here. About half the plants that I put in over the years have survived, but they do not grow very large (blades of fronds rarely a foot long).

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Growing Ferns in a Cold Climate *continued from page 13*

Athyrium otophorum is slug bait, but lovely slug bait. One of the two original plants is healthy after ten years, but I am weary of maintaining slug traps around it.

Some other ferns don't work well at all. ***Adiantum aleuticum, Athyrium cyclosorum, Dryopteris expansa*** and ***D. dilatata*** (both species, and **'Jimmy Dyce'**) all flourish on the western sides of continents with their more even, moist climate. I remember ***D. dilatata*** from glens on the west coast of Scotland (my wife's home) whose huge fronds look like something out of "Jurassic Park". Mine are still alive, but only just, after ten years, and rarely have foot-long fronds. The ***A. cyclosorum*** is a small curiosity. I put in a fine ***Polystichum munitum*** from the Cascades; it survived five years, returning each year smaller than the previous.

I am not certain which aspect of our climate is most unsuitable for these west coast ferns, but I suspect that our dry summer days, with a large temperature range, may provide the greatest stress for them. Some other ferns which are spectacular in Seattle persist here, but as much smaller plants. ***Dryopteris wallichiana*** and ***D. lepidopoda*** still come up each year, but I would not call them successful, and I can't recommend them for this climate. ***Arachniodes standishii*** is a lovely plant, but its fronds rarely reach a foot in length. If I hadn't seen fine, large plants near Seattle I would treasure it as a small gem. ***Dryopteris championii*** and ***Polystichum rigens*** simply failed to survive their first winter. ***Dryopteris remota*** grows well here but is badly attacked by slugs. Because it is otherwise similar to ***D. affinis,*** I have written it off in my garden.

Slugs are the main garden pests. I use metaldehyde bait and beer bottle traps with some success, but slugs are especially difficult to battle in the early spring. ***Diplazium pycnocarpon*** requires close attention at this time. The closely related ***D. celsa*** and ***X australis*** are both severely attacked. ***D. remota*** seems to be much more susceptible than its close relative ***affinis.*** Curiously, I have no problems with ***D. goldiana,*** but a friend in northern New Jersey has serious slug problems with this species.

The only insect pest that seems not to have attracted notice by others is an unnamed saw fly larva (Tenthredinidae). I found a larva perched atop a newly severed stem of a ***Woodwardia aerolata*** with an unmistakable "who, me?" look on its tiny face.

My thick bark mulch has attracted earthworms and other fauna, and in turn, these have attracted abundant shrews (two species) and moles. These do no harm to the ferns, but the moles make walking on bark paths somewhat like stepping on a waterbed. Deer are abundant in the garden but only bed down in the winter, when they cause no damage. The local bear that occasionally visits our bird feeders always has the decency to walk on the paths only.

Fern fiddleheads appear in late March, with ***Osmunda regalis*** nearly always the earliest to appear. Its tiny white "buds" can appear by mid March, but in especially bitter years might not appear before the third week of April. The other two ***Osmunda*** are only slightly later than ***O. regalis. Adiantum pedatum*** generally appears by the third week of April, and ***Diplazium pycnocarpon*** by the fourth. The ***Dryopteris*** and ***Polystichum*** species are difficult to tabulate, because their coiled fiddleheads are already visible by the late winter, and recording their development is difficult. The exotics that appear

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Fern Cultivation in Northern Utah

James R. Horrocks
Salt Lake City, Utah

The shaded garden is incomplete without the beauty and grace of the ferns to lend their elegance and charm. Here in northern Utah, it is often assumed that their cultivation is difficult, if not impossible. The few ferns we see are usually the common ostrich fern from the eastern United States and Canada or less often Utah natives such as the lady ferns or the male fern. In more recent years, many exotic species have become available, mainly from Europe and Asia. In a region of the country where it is perhaps more prudent to use plants that require less water, having a fern garden may seem a bit foolhardy. It is certainly a challenge and a sizeable fern garden is unique in northern Utah.

Dryopteris filix-mas Barnes. Photo by Kim Durrant, Salt Lake City.

However, if given adequate conditions such as a shady, protected area where the humus-rich soil is kept well mulched to conserve moisture and keep the soil cool, ferns will thrive and, believe it or not, require far less water than the average lawn. Other considerations are not only the cold-hardiness of a particular species, but also how well they do in hot weather. Many species are not suitable for our semi-arid climate but surprisingly there are quite a few that are able to literally thrive here. Tolerance of less humidity in the semi-arid west as well as soil requirements are also important factors. Semi-arid climates tend to produce alkaline soils and attempts with ferns that must have acidic soils are usually a waste of time. Soil acidifiers are sometimes helpful but great care must be taken. Many ferns are surprisingly tolerant of a variety of soil types. Certain mountain species do miserably in the valley garden and the reasons are not always clear. The following list of ferns represents many years of experimentation.

Among the adiantums, the strongest growers in my garden are *A. vemustum* (HFF Vol. 4, Number 4) and *A. aleuticum*, (see *A. pedatum* HFF Vol. 8, Number 4) the latter best grown between flat stones where its roots are kept cool and moist. *A. vemustum* is sometimes difficult to establish, but when it takes hold, it thrives and is evergreen if covered with snow or leaves before bitter cold weather. *A. pedatum* is less dependable,

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growing well at first but slowly dying out after several years. *A. capillus-veneris* has survived winters in the Salt Lake area but these may be an exceptionally hardy variety and certainly not the type species from southern Utah. *A. monochlamys* is not very hardy here, nor is *A hispidulum. A capillus-junonis* did not survive the low humidity.

The genus *Arachniodes* has not fared well because of low humidity. They do thrive in a large cold frame. Species attempted include *A. simplicior* 'Major'. *A standishii. A. maximowiczii* and *A. cavalerii.*

Aspleniums have been difficult to grow here. Low humidity is the big problem and slugs and snails are a major nuisance. Attempts to grow *A. platyneuron* (HFF Vol. 2, Number 2) and *A. trichomanes* (HFF Vol. 12, Number 4) have ended in disappointment.

The so-called lady ferns of the genus *Athyrium* have had mixed results here in the valley. The eastern species and exotic varieties from Great Britain have done poorly, but the western lady fern, *A. cyclosorum* that is native to the Utah mountains has done rather well. (see HFF Vol. 9, Number 1 for a treatment of the lady ferns). Another western native, *A. alpestre* (*A. distentifolium*) is mentioned by some authors as "not cultivated" but there are thriving clumps here in the Salt Lake Valley. Being deciduous, lady ferns tend to look less attractive after a hot summer. Other athyriums attempted include *A. mesosorum* that eventually died out and a number of varieties of *A. niponicum*, the Japanese painted ferns, that have never particularly thrived in the lower humidity. *A. otophorum* was hardy but too cautious in its growth and obviously needs more humidity than is available here.

The blechnums have been troublesome. They require high humidity and acid soil. Species attempted have been *B. spicant* (HFF Vol. 5, Number 3), *Blechnum penna-marina* (HFF Vol. 8, Number 1) and *B. discolor*, all with the same disappointing results.

Cheilanthes are tricky in that most need some sun but with their roots protected under slabs of stone. Presently the only species surviving here is *C. lanosa (*HFF Vol. 13, Number 1) that grows in between concrete and sandstone. *C. tomentosa* (HFF Vol. 10, Number 2) showed promise but then succumbed the first winter. I may attempt it again. *C. siliquosa*, now classified as *Aspidotis densa*, is rare in the mountains of Utah and referred to as "Indian's Dream". Attempts to cultivate it have not been successful.

The hardiness of *Coniogramme* is questionable and efforts to grow both *C. intermedia* and *C. japonica* failed. They are highly susceptible to slugs, being eaten to the ground before the end of summer.

Cryptogrammas are mostly alpine plants that refuse to grow in the valley garden. *C. acrostichoides,* the parsley fern, native to Utah and a "fanatical lime-hater" did miserably in my garden. *C. stelleri,* known only from one locale in Utah has never been attempted.

Cyrtomium is a genus close to *Polystichum* and some species are a great deal hardier than assumed. *C. falcatum* does well if planted up against the foundation of the home. It is not reliably hardy out in the open garden. The hardiest of the cyrtomiums is *C. fortunei* (HFF Vol. 5, Number 1) that has toughed it out through some very cold winters. It is very dependable as is the more robust *C. fortunei* var. *clivicola.* Both have thrived in the

author's garden. Also hardy here is *C. macrophyllum* (HFF Vol. 11, Number 2) with its large un-fern-like fronds. *C. caryotideum* is very timid. It has survived here planted up against the foundation of my home but produces only two or sometimes three fronds in a growing season and the fronds are never very large. A new acquisition from Ullung Island in Korea is a variant of *C. balansae* that has done very well here over two winters. (It is now believed to be a type of *C. fortunei*..... ed.)

Both *Cystopteris fragilis* (HFF Vol. 14, Number 1) and *C. bulbifera* (HFF Vol. 6, Number 3) are native to Utah and are quite at home in my garden. Also cultivated here is the hybrid *C. tennesseensis.*

Dennstaedtia has not done well here. *D. punctilobula* proved difficult to establish and unable to adapt to the lower humidity. *D. wilfordii* from Japan, with its curious narrow fronds failed as well.

Deparia acrostichoides, the silvery glade fern, originally classified under *Athyrium* as *A. thelypteroides,* has grown rather well here in my garden. It tends to spread so some caution is advised.

Diplazium pycnocarpon (see under *Athyrium* HFF Vol. 2, Number 2) is a strong grower here, needing only adequate moisture and protection from late spring frosts and wind. The once-pinnate fronds are unique among North American deciduous ferns. My colony is 40 years old and has been moved no less than four times. I also attempted *D. okudairae* from Japan, which made it through one winter but then perished, low humidity likely a factor.

Doodia media survived one cold winter planted up against the house but eventually died out.

Dryopteris is represented in my garden by a number of species and I will list them below in alphabetical order with comments.

D. affinis – fair performance.

D. arguta (HFF Vol. 4. Number 3) Attempted but eventually died out. This species needs acid soil.

D. x *australis* – This hybrid has done well here over several years.

D. blanfordii – This one comes up faithfully every year but never gets very large.

D. carthusiana – Grows fairly well here but not especially thriving.

D. caucasica – A strong grower but resents being pampered.

D. celsa - Comes up each year but not especially showy. May need a more acidic soil.

D. championii – Attempts to grow this species have always failed.

D. x *complexa* – This robust hybrid has done well here but does not like being transplanted if already established. The same is true with variety 'Stableri'.

D. crassirhizoma (HFF Volume 14, Number 4) Three plants are doing well now after several failed attempts.

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Fern Cultivation in Northern Utah *continued from page 17*

D. cristata – Attempted but short-lived. Needs acidic soil.

D. cycadina – (*D. atrata*) Seems happier nestled between large rocks than in the open ground. A strong grower and evergreen.

D. cystolepidota (*D. nipponensis*) Hardy here but not a strong grower. Low humidity probably a factor.

D. dilatata (HFF Vol. 8, Number 3) Grown for several years but not very impressive. Usually they have died out in the past. They need ample humidity and an acid soil.

D. erythrosora (HFF Vol. 13, Number 4) Needs humidity. I have a clump growing now but I cannot say that it is thriving. A marginal performer here. Evergreen.

D. filix-mas – This is the only species of *Dryopteris* native to Utah. It is certainly one of the easiest to grow. Varieties of this have done quite well here including *D. f-m* 'Barnesii'. *D. f-m* 'Grandiceps', and *D. f-m* 'Linearis'.

D. goldiana (HFF Vol. 3, Number 2) Must be grown in soil rich in leafmold. It does fairly well here but never attains the magnificent proportions reported from more humid localities.

D. hondoensis – A *D. erythrosora* type. Rather disappointing.

D. intermedia (HFF Vol. 12, Number 3) - Easily grown but needs a more acid soil to be at its best.

D. juxtaposita (HFF Vol. 11, Number 1) - A good strong grower but transplanting after established should be avoided. The larger foliose form, which is often, misidentified, as *D. stewartii* has also done well here.

D. koidzumiana – I obtained spores of this from Barbara Joe Hoshizaki and it has so far survived well in the cold frame, but I am apprehensive about its performance in the garden. It is very close to *D. erythrosora* but smaller and with more coppery new growth.

D. kuratae – Often identified as *D. pycnopteroides*, this species has done quite well here over several years.

D. lacera – A rather coarse looking evergreen fern but easily grown.

D. lepidopoda – Hardy here but not a strong grower. Needs more humidity.

D. marginalis – (HFF Vol. 5, Number 4) Probably the most adaptable of any *Dryopteris* I have encountered. This species will grow in shadier spots than many others. I have grown this evergreen for many years.

D. neorosthornii – Cold hardy but in the same league with *D. lepidopoda.* Both do better in the cold frame.

D. oreades 'Crispifolia' – Has done fairly well here over several years.

D. pacifica – Cold hardy here but of very cautious growth.

D. pseudo filix-mas – Attempted once but did not do well.

D. remota – (HFF Vol. 12, Number 1) This species has done well here although it never gets very large.

D. sieboldii – Susceptible for slugs and snails here. Cold hardy but needs ample humidity. Ultimately failed here.

D. sichotensis (D. coreano-montana) - Very hardy here and a delight in the garden.

D. sublacera - (HFF Vol. 11, Number 3) A charming medium sized fern that has thrived here in Utah

D. tokyoensis – Attempted several times but with the same disappointing results. Low humidity a problem.

D. uniformis (HFF Vol. 4, Number 2) – A beautiful species and a strong grower. It seems happiest growing next to large rocks.

D. varia – Attempted but not very hardy and needing more humidity.

D. wallichiana (HFF Vol. 6, Number 1) – A species appreciating higher humidity than we have here. It has recently survived in the garden but is a marginal performer. Better in a large cold frame.

Gymnocarpium dryopteris was attempted here several years ago but did not thrive and eventually died out. Higher humidity and a more acidic soil are needed. *G. robertianum* did not do well either even though I had high hopes for it since it likes an alkaline soil. Slugs would not leave it alone.

Lygodium japonicum – Grew fairly well the first season but winter-killed.

Matteuccia struthiopteris (HFF Vol. 5, Number 2) Certainly the most commonly grown fern in the valley gardens but not native to Utah. Being deciduous it does look rather sad by late summer. The more water and the higher the humidity, the bigger it grows.

Onoclea sensibilis – Mainly an acid-loving swamp fern. It did not do well here at all.

Osmunda – I have grown *O. cinnamomea* (HFF Vol. 3, Number 4), *O. regalis* (HFF Vol. 7, Number 4), and *O. claytoniana* (HFF Vol. 11, Number 4) but these acid lovers never seem to thrive for me. I am aware of the latter two being successfully grown in other gardens in Salt Lake. Soil acidifiers are helpful.

Pellaea atropurpurea has survived in the garden but always ends up dying out. *P. breweri,* a native to the alpine limestone areas of Utah did not survive in the valley garden.

Phegopteris decursive-pinnata (HFF Vol. 10, Number 1) - Cold hardy here but of rather cautious growth. Not recommended for low humidity climes. The same can be said for *P. hexagonoptera* (HFF Vol. 6, Number 4 as *Thelypteris hexagonoptera).* This species survived for two seasons and then died out.

Phyllitis scolopendrium (HFF Vol. 7, Number 2) Grew very well here for several years but then diminished possibly from its susceptibility to root-rot. It still survives in the garden but never has regained its original splendor....hmmm.

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Fern Cultivation in Northern Utah *continued from page 19*

Polypodium – These ferns seem to need more humidity than is available here. I have attempted *P. virginianum* but without much luck. *P. hesperium* is native to Utah and a specimen given to me by Dr. Michael Windham did survive for two seasons, but apparently was not able to establish itself and eventually disappeared.

Polystichum is probably my favorite group of ferns. I will list them in alphabetical order with comments.

P. acrostichoides (HFF Vol. 7, Number 1) – After many attempts I have for the most part given up on this species. It is said to do better in sterile soils, garden soil being too rich. It may also like more acidic soil than I can provide.

P. aculeatum (HFF Vol. 6, Number 2) – Tolerant of alkaline soils, this species has done very well here over the years. It grows best in medium to high light. It will die out in low-light areas.

P. andersonii (HFF Vol. 14, Number 2) – I have always had appalling luck with the polystichums of the Pacific Northwest. Several attempts with this species have always ended in failure.

P. braunii (HFF Vol. 10, Number 3) – Has done rather well here for many years.

P. braunii x andersonii – A large and very robust fern that produces a proliferous bud near the apex. This hybrid has thrived here, the crown an enormous three inches across.

P. braunii x proliferum (*P. x dycei*) – Frond buds of this and the preceding were sent to me by Dr. Berndt Peters of Germany. The fronds are light green here and this species has also done well.

P. deltodon (HFF Vol. 3, Number 3) – A real gem and surprisingly hardy, producing its unique once-pinnate fronds throughout the growing season. It does appreciate higher humidity though.

P. lentum – This species from the Himalayas and China did not do well here and eventually died out.

P. lepidocaulon has survived in the cold frame but is not very hardy outside. Needs ample humidity.

P. lonchitis – This is another alpine species native to Utah. It also grows at lower elevations to the mouth of Little Cottonwood Canyon, not far from my home, but it will not grow in the valley.

P. makinoi (HFF Vol. 9, Number 2) – One of the most beautiful polystichums. It has done very well here over many years.

P. munitum – Several attempts to grow this in my garden in various locations have proved rather disappointing and yet I know of its successful cultivation in some other gardens in Salt Lake. I am still experimenting with it, trying soil acidifiers.

P. neolobatum (HFF Vol. 2, Number 3) – An elegant fern and one of my personal favorites. It has thrived here for many years. Very beautiful!

P. polyblepharum – Another very attractive species. Originally, I had dreadful luck with these but in the last several years new specimens have done quite well.

P. proliferum – This species from "down under" has always failed here.

P. pseudo-makinoi – Very hardy here and surprisingly vigorous. It is close in appearance to P. makinoi and P. tagawanum but with more blunt pinnules.

P. retroso-paleaceum (HFF Vol. 13, Number 2) – This species has done reasonably well here for several years but certainly resents being transplanted after being established.

P. richardii – Another southern hemisphere fern and like *P. proliferum* did not prove to be very hardy. Low humidity here is also a problem.

P. rigens (HFF Vol. 7, Number 3) – Of somewhat cautious growth here but does survive from year to year and has produced some sizeable fronds. It is unfortunately a target for slugs and snails, possibly due to its skunk-like odor, unique among ferns.

P. setiferum – Several varieties or cultivars have done reasonably well here while others have not. Varieties *P. s.* 'Rotundatum cristatum', *P. s.* 'Pulcherrimum', *P. s.* 'Herrenhausen' and the rare *P. s.* 'Plumosum Bevis' have done rather well.

P. setiferum x *andersonii* – This hybrid has established itself well here and is a beautiful addition to the garden.

P. setigerum – The true "Alaska fern". This species was attempted once several years ago but without success.

P. tagawanum – Recently attempted and so far so good. It is regarded as easy to grow.

P. tripteron – This is a cold-hardy species but it requires higher humidity than we have here. It has never done very well.

P. tsus-simense (HFF Vol. 12, Number 2) – Cold hardy here but of somewhat subdued growth. It is at its best nestled among large rocks.

P. vestitum – The New Zealand polystichums have been a big disappointment here and this species is no exception. Attempted twice but failed.

P. xiphophyllum – A gorgeous glossy fern from China, this gem has adapted very well here and has thrived.

Pteridium aquilinum - Will certainly grow in any garden, even taking some sun here if given adequate moisture. I have always found it difficult to establish.

Pteris cretica and *P. multifida* have been attempted here. Slugs eat them up and they have always been winter killed.

Thelypteris kunthii, the maiden fern, has survived two winters here in a protected spot. It is rather late with its new growth in the spring. *T. noveboracensis* is very hardy but has never grown well here and has always died out. Low humidity likely the problem. *T. parasitica* did survive here through two winters but I eventually lost it.

Woodsia – There are three species in Utah, two of which occur in the north. They are *W. oregana* and *W. scopulina.* I tried one of these some years ago (I'm not sure which) but

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Recommendations from North Central Kentucky, USA

Ralph C. Archer
Shelbyville, KY

Ferns at Whitehall, Louisville, KY Photo by Ralph Archer.

Compared to areas on the east and west coasts and the adjacent mountain regions, many areas in the south central part of the United States are relatively fern poor. Greater Louisville, KY is such an area having a limited number of fern species. When looking at native fern distribution maps, it is apparent that this area is generally at the southern edge of the ranges for many of the northern fern species, at the north edge of ranges for some southern species and at the western edge of ranges for many eastern species.

The reported native fern population for Jefferson County, KY consists of 29 species from 17 genera. Local native designation was determined by the ferns being shown as native to Jefferson County on the county distribution maps in the book, Ferns and Fern Allies of Kentucky by Ray Cranfill. The population count by individual genus shows that *Asplenium* has the highest number of species with five. *Dryopteris* and *Osmunda* are next with three each. The remaining 14 genera have from one to two species each. Many of these ferns are members of the widely distributed eastern North American natives that cover most of the eastern United States, such as *Adiantum pedatum* and *Polystichum acrostichoides*. Since the underlying rock is generally limestone, four of the five native aspleniums and both of the native pellaeas are species that favor a limestone outcropping. The effect of the lime-rich area is expressed in the soil preferences of a sizable number of the other locally native ferns. They are listed as terrestrial in circumneutral to sub acid soil in A Field Manual of the Ferns & Fern Allies of the United States & Canada by D.B. Lellinger. *Osmunda regalis* and *O. cinnamomea*, which favor acid soil, were found on the flood plain areas of the Ohio River Valley near Louisville.

From a weather standpoint, the area is located at the north edge of Zone 6 on the current USDA Zone Hardiness Map. However, the local climate is strongly influenced by the Ohio River. The detail map, which has the zones divided into sections a and b, shows a band of zone 6b running through zone 6a along the river valley. Some professionals in the horticultural field believe that the effect is so strong that parts of the area are actually

zone 7, based on the performance of some plants. Over the past five years, the recorded minimum temperature ranged from 2F to 10F, which is a Zone 7 range. Like most metropolitan areas, the outskirts can range several degrees below that which is reported at the weather office. During this period, my personal garden was located in an area that had a zone 6b climate with only an occasional temperature near -5F. The Whitehall fern display garden in Louisville appears to be in the possible zone 7 band.

The other major impact of winter weather on plants is from the strong cold fronts that pass through the region periodically. The all-time recorded low temperature is -22F. Temperatures ranging from -12F. to -17F. have been sporadically recorded in areas on the outskirts of the main metropolitan area. Since the area is well south of those normally covered by snow, abnormally low temperatures can cause serious damage to plants not given protection.

These cold fronts also impact the area, usually in the month of April, in the form of hard freezes that can occur any time during the month. The frond emergence study made for the years 2001 and 2002 showed that ferns in eastern Jefferson County, KY started emerging during the first week in April and that half of all the species had started emergence by the middle of the month. A severe freeze that occurred in late April, 2000 resulted in serious damage to those plants that had emerged. It appeared at the time that some exotic ferns were damaged more severely than the local natives.

Summer weather also appears to significantly affect the fern diversity. By the first week in July, the average maximum daily temperature has reached 87F. and peaks in late July at 88F. It begins to cool about the middle of August after a total of 38 days where the average maximum temperature is 87F. or 88F. In four of the past five years, there were days in each of the months of June, July, August and September when the temperature reached over 90F. Most of these months had some days when the temperature reached into the middle and upper nineties. Most years have periods up to a week or more when the maximum temperature stays above 90F. and the night minimum temperature stays in the middle or upper end of the 80 to 90F. range with high humidity.

This summer weather seriously stresses a number of ferns from the northern and mountain populations. In general, ferns that have these origins do not grow well in our summer weather. *Dryopteris expansa* and especially a number of the polystichums, such as *P. andersonii* and *P. braunii*, are ferns that were planted here, then declined during summer months and died. Other ferns, such as *P. setiferum*, do survive but are never close to the glory of those grown in the Pacific Northwest. The jury is still out on the garden worth of some of the newly introduced *Dryopteris* from the mountain areas of Asia. A number of them were planted and have not done well, but not enough have been planted to definitely determine their worth here.

The worst summer for ferns in my experience was in 1999 when the maximum temperature for July reached 104F and the rainfall was 0.51 in. This was followed by a maximum temperature in August and September of 98F, and rainfall was 0.97 in. and 0.53 in. respectively. That summer caused significant stress to native populations as well as garden plants.

The following list of recommended ferns is based on personal experience with three or more individuals of each species, in a variety of conditions, at my residence garden for at

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least five years. Many of these ferns were among the first ones planted at the time I started to grow ferns. All the recommended ferns grow well here, not merely exist from season to season. Some do grow more strongly than others, but all have done very well over a period of some years. HR stands for highly recommended. These are the ferns that stand out and get the question "What is that one?" They also are many of my personal favorites due to form, color or vigor during most seasons. Some are evergreen, which adds fall and winter interest to the garden. My preferred form for *Athyrium filix-femina* ssp *angustum* is the New England Wildflower Society cultivar 'Lady in Red'. The list also includes the native range of the ferns. Local native designation was determined by the ferns being shown as native to Jefferson County, KY on the distribution maps in the book by Ray Cranfill, previously mentioned. All of these ferns do well when planted in a natural woodland garden. All should thrive if given an accommodating location in the garden and reasonable moisture during the season.

Adiantum pedatum		Local Native
Asplenium scolopendrium		Europe-Asia
Athyrium filix-femina (European)		Europe-Asia
Athyrium filix-femina ssp *angustum*	HR	NE North America
Athyrium niponicum 'Pictum'		E Asia
Athyrium otophorum		E Asia
Athyrium x 'Ghost'	HR	Garden Hybrid
Cystopteris bulbifera		Local Native
Dryopteris x australis	HR	SE North America
Dryopteris celsa		E North America
Dryopteris clintoniana		NE North America
Dryopteris crassirhizoma		E Asia
Dryopteris erythrosora	HR	E Asia
Dryopteris goldiana		Local Native
Dryopteris intermedia	HR	Local Native
Dryopteris marginalis		Local Native
Dryopteris pseudo-filix-mas	HR	S Mexico
Polystichum neolobatum	HR	Asia
Polystichum polyblepharum		Japan-Korea

The following discusses cultural needs for the above ferns based on my experiences growing them. Most are well adapted to a normal woodland type soil in dappled shade. They also do well in humus-rich garden soil, if in shade from midmorning through afternoon and if given adequate moisture during the growing season. Ferns with special requirements are discussed in more detail.

Adiantum pedatum

For best growth in this area, it needs a woodland location that simulates its preferred natural location on shady, north-facing wooded slopes near a drainage area or channel. It prefers a woodland type soil that is circumneutral. It will have good growth in a garden location, if it is provided with good drainage, regular moisture, a humus rich, circumneutral soil and shade from mid-morning to late afternoon.

Asplenium scolopendrium

This fern is best grown in a limestone rock garden in a humus-rich soil with good drainage. Over-watering should be avoided as it is subject to root rot. In areas with lime-based soil, as in the Kentucky bluegrass, it can easily be grown in the ground in humus-rich soil. However it is best to provide excellent drainage such as a site on a slope. It likes medium shade but will grow in fairly heavy shade.

Athyrium filix-femina (European)

If it receives ample moisture, this fern will tolerate more sun than almost any fern recommended here. Ferns grown in sun until late morning and/or in sun during the mid to late afternoon became noticeably larger than those grown in shade. It likes a humus-rich woodland type soil.

Athyrium filix-femina (North American)

The native northern lady fern (ssp *angustum*) likes a sub acid woodland type soil, ample moisture and dappled shade. It seems to prefer more shade than the European *A. filix-femina*, but with ample moisture it will tolerate sun until mid morning. As previously mentioned, 'Lady in Red' (forma *rubellum*) is an excellent cultivar with good stem color. While it takes two to three years or more to develop the best color, the young fern is a very nice appearing, immature lady fern.

The southern subspecies of the native lady fern (*A.* ssp. *asplenioides*) is not listed as recommended since it is rather rare in commerce and its range ends not too far north of here. It probably is a better fern for a woodland planting in this area or areas further south, as it seems to grow somewhat more strongly here. Alas, it does not have the wonderful red stipes of *A.* ssp *angustum* forma *rubellum*.

Athyrium niponicum 'Pictum'

This fern grows well in our climate of hot summers and high humidity. It is the only fern that naturalized in a large number of places around my garden. It is a very hardy, very good garden fern, which makes a nice display either as an individual plant or in a mass planting. It needs an ample supply of water, but also needs good drainage. Plants in bright full shade, with ample water and good drainage seemed to have the best color and retain it longer. Ferns growing in dappled shade were bigger, but became lighter in color. My experience has been that the longer the exposure to sunlight, the lighter the color.

Athyrium otophorum

This fern is my personal favorite of all of the hardy variegated ferns. It will not grow well here, if exposed to long periods of sun. The best site seems to be the north side of a small tree or large shrub that provides dappled shade for almost the entire day. Like all lady ferns, it likes ample water and seems to favor a slightly acid soil.

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Recommendations from North Central Kentucky, USA *continued*

Athyrium x 'Ghost'

In my opinion, this is the most spectacular of any of the recently introduced cultivars and hybrids of *Athyrium*. It forms a vertical clump of fronds with a lovely gray coloration. The color seems best when given shade and water similar to the *A. niponicum* discussed above.

Cystopteris bulbifera

Best grown on a limestone rocky bank in shade. If planted near the top of the bank, where the bulblets can roll down and establish, it will form a large patch. The fiddleheads as they first emerge are the most colorful of any of the native ferns, and make a wonderful early spring display. It will grow reasonably well in circumneutral, garden soil with good drainage, again providing the wonderful spring color.

Dryopteris

Most of these ferns do well in a moist woodland situation. All will grow in a rich woodland-type sub acid soil, although two prefer a more acid soil and one prefers a circumneutral soil. A number naturally grow in wet areas or on the edges of swamps and will also do very well in wet conditions near streams. My experience has been that all have a growth habit that is erect-arching to erect as mature ferns. The frond lengths range from two feet for the shortest to five feet for *D. x australis*. All benefit by having a light mulch of chopped oak leaves, pine needles or fine pine bark applied around (not over) the ferns in late fall. This is more necessary for the ones identified as the lovers of a somewhat more acid location. I prefer to leave the fronds until spring to provide natural mulch and cover for the rhizome. All grow well in dappled shade, although most will tolerate some morning sun. *D. marginalis* grows best in bright full shade in this area.

D. x australis

This fern does best in humus-rich, moist soil in a sheltered location. It needs protection from strong wind. It makes a bold statement in the garden with its erect size and lustrous dark green color, and has semi-evergreen fronds that fall flat to the ground after a hard freeze, but provide wonderful mulch for the fern, as well as its neighbors.

D. celsa

D. celsa would be a better choice for the small garden than *D. x australis*. It is a tall, vertical fern with good stamina and growth, but does not get as large. It stays green about as long into winter as *D. x australis* does. It does best in moist, very humus-rich, moderately acid soil. In nature it grows on rotting logs, hence the common name "log fern".

D. clintoniana

It is a very vigorous, hardy fern and makes a wonderful mass planting. It grows very well in a moist, woodland garden or in a bed with good moist soil.

D. crassirhizoma

This fern has an erect crown rhizome that gives it a wonderful vase shape of up to three and a half feet. It makes a wonderful specimen in a moist garden or woodland soil.

D. erythrosora

This is another fern that grows well in a garden bed with dappled shade or in the woodland. It is known for its lovely bronze fiddleheads as well as young foliage. With age, those in my garden developed an erect, stately growth habit and the evergreen foliage lasted all winter, even above heavy snow. It is a lovely fern for all seasons.

D. goldiana

D. goldiana is a wonderful fern for the woodland. It becomes bushy and erect-arching with age. The oldest ones in my garden became massive with time, and attracted much attention due to their size. It has gravitas!

D. intermedia

This fern should be in every natural fern garden in this area. A well-grown one attracts attention, as it has the most delicate appearing fronds of any of the native ferns. It also has good color well through winter. Its preferred habitat in KY is the sandstone outcrop areas and it avoids the bluegrass limestone area. It is best to amend the soil prior to planting in areas where the soil is neutral to calcareous. It prefers a sub acid condition and full bright shade in this area.

D. marginalis

This plant was the least sun tolerant of all the native *Dryopteris* in my garden. When exposed to sun until about midmorning, due to the loss of a tree, three mature ferns went into serious decline. In Kentucky, it is most common in the limestone-rich, Bluegrass Region, but it appears to be tolerant of sub acid soils in other areas. If given well-drained garden soil with good shade and sufficient moisture, it becomes a lovely fern with its vase shape and lustrous, fully evergreen fronds. If given a circumneutral, well-drained soil on a north or east facing rocky slope with dappled shade all day long, it can grow to be a wonderful, specimen fern.

D. pseudo-filix-mas

It is the most adaptable, exotic fern in our region of any I have grown. It is the fern of choice for one that has the appearance of *D. filix-mas*. In addition, it continues to send up new fronds until well into autumn. It seems adaptable to most garden or woodland situations and soils, growing well on circumneutral to sub acid soils in shade as well as morning sun.

Polystichum

The only *Polystichum* native to the southeastern United Stated is *P. acrostichoides.* I have not been successful in growing several of the native northern or some of the exotic species. The hot, humid summer climate seems to prevent some from good growth and others from survival. The two listed below are exceptions, which grow extremely well in our area and provide the wonderfully lustrous, polished green fronds of this genus.

P. neolobatum

This fern grows in moist woods from India to Japan across much of Asia. It is a very erect, evergreen fern that stands out in the garden, and has received much favorable

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notice by garden visitors. Many of the fronds of the fern in the local garden noticeably curve like a scimitar, which gives added interest to the fern. It grows well in woodland soil with regular moisture.

P. polyblepharum

This popular fern likes a good garden soil. It is a very lustrous, arching, evergreen fern. It grows best with a consistent supply of moisture, but will grow with a moderate amount as long as it does not dry out completely.

Comments on fern cultivars and other difficult ferns for the area.

Like all fern gardeners, I planted some of the numerous cultivars of *Athyrium filix-femina, Dryopteris filix-mas* and *D. affinis*. In general, the stronger the genetic variation from a normal appearing plant, the poorer the fern's performance. The strongly crested, congested or dwarfed forms did not do very well. Most declined and died. Cruciate forms like 'Victoriae' or the simpler forms of the crested lady fern cultivars seem to do much better. The *D. filix-mas* cultivars that performed well and are recommended are 'Barnesii', 'Cristata Martindale', and 'Grandiceps'. For more notably crested ferns, two cultivars of *D. affinis* also did reasonably well and are recommended. They are 'Cristata' (the King) and 'Cristata Angustata'.

A number of ferns sometimes rated as zone 6 cold-hardy plants were omitted from the recommended list as they did not perform well in my garden, which was usually a cold zone 6. *Cyrtomium falcatum* did not survive in north Zone 6 and is marginal in south Zone 6, based on the experiences in the gardens of two other very experienced gardeners, in addition to my own. It does very well in a sheltered location at the Whitehall Historic Home garden, probably Zone 7. It makes its best growth after the heat of summer starts and continues to send up fronds until fall. *C. fortunei* does grow in the colder areas, although a colder than normal winter can cause poor performance the next spring. *Arachniodes simplicior* var. *variegata* has given a mixed performance in Zone 6 locations, by having good growth and hardiness in some locations, but not in others. This is a fern that should be planted in Zone 7 and tried in protected locations in Zone 6.

Asplenium trichomanes is the most ornamental of all the locally native spleenworts. It is a difficult fern for many gardeners to grow, even in this area where it is native. It will not grow in an average garden location in garden soil. It needs a limestone rock garden, where it will grow best when located in a rock crevice. Contrary to some suggestions, it does not seem to tolerate our summer sun well. The other native aspleniums grow on limestone ledges or rock faces, mostly in moss, which coats the rocks, except for *A. platyneuron*, which prefers a somewhat dry location on sub acid rocks.

When I first started to plant woodland gardens, I planted ferns that would have been best avoided, considering the limestone based soil of my garden and the climate. I killed some. I learned that some would survive, but never reach the glory of ferns that are well suited to the site. I learned that some were right for their location. I also learned that much of the pleasure from gardening is learning which ferns belong in which category.

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The HFF Welcomes the Rotary Garden as Our Newest Display Garden

Rotary Gardens - Janesville, WI

Mark Dwyer

Rotary Gardens History

Rotary Gardens was started in 1989 by Dr. Robert Yahr, a retired orthodontist in Janesville. The original 15 acre site that is now Rotary Gardens was the Wilcox Sand & Gravel Company at the turn of the 20th century. This site included a brick building and a large sand and gravel pit. The original building is part of our existing visitor's center and the original pit filled with water when natural springs were exposed, creating the three acre pond around which the gardens are currently situated.

When the Wilcox Sand & Gravel Company closed in the early 1900s, the City of Janesville bought the land and used both the building and land for various storage functions. The site itself was quite barren and interestingly, was positioned between Lion's Pond and Kiwanis Pond, both projects of the local service clubs back in the 1950s. Dr. Yahr walked this site in the 1980s and had a vision for an internationally-themed botanic garden. Having traveled the world and visited many gardens, Dr. Yahr thought that this site would be ideal for a community garden. He asked for the support of the two Janesville Rotary Clubs as well as the blessing of the City. There was positive support all around and the land was leased for $1 from the City of Janesville for

Japanese Garden, photo by Mark Dwyer.

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Rotary Garden *continued from page 29*

99 years. Ground was broken in 1989 with the planting of trees and creation of the Japanese Garden. New gardens have been added every year since groundbreaking in 1989.

Dedicated to international peace and friendship, the gardens have developed to include over 20 different garden areas encompassing 20 acres. Most of these gardens are internationally-themed. Some examples include the English Cottage Garden, Italian Formal Garden, French Formal Garden, Japanese Gardens, Scottish Garden, Sunken Garden, Reception Garden, etc. The gardens recently added 10,000 sq. ft. to the visitor's center to include classrooms, multi-use space and larger bathrooms and gift shop. A new 6,000 sq. ft. maintenance facility was also added as well.

Rotary Gardens has over 100,000 annual visitors and is becoming known for its collection-oriented plantings and stunning seasonal displays. Thousands of children utilize educational programming at the gardens and the gardens have also become quite popular for tours and weddings alike. In terms of plant materials, Rotary Gardens is heavily planted and takes pride in extensive collections of bulbs, unusual seasonal plants and permanent plantings as well. Increased community and regional support will help Rotary Gardens continue to grow and actively pursue its mission of "providing horticultural education for all people."

The history of the Fern & Moss Garden is as follows:

In 2002, the Rotary Gardens founder, Dr. Robert Yahr, came up with the idea for a fern & moss garden to be situated adjacent to our Japanese Garden in a 1/3 acre area that was devoid of any development (or interest). Our Japanese Garden is the first international garden created at Rotary Gardens and continues to be the most popular. Incidentally, our Japanese Garden has been ranked as one of the Top 25 in North America.

Dr. Yahr wanted the fern & moss garden to tie into the Japanese Garden in terms of style. Mark Dwyer created a plan in the winter of 2002 that incorporated two waterfalls, meandering streams, two pools, paths, six beds for ferns and a "moss island" all of which would be situated under an overhead canopy of cottonwoods. In March of 2003, the garden was constructed by a local landscaper who also built an authentic Japanese structure which is meant for contemplation and resting.

Staff and volunteers then planted over 300 labeled ferns representing 170+ taxa. The small moss island was planted with moss transplants from other parts of Rotary Gardens. Rocks were used to line the paths, a small arched bridge was added and two Japanese lanterns were also installed. Later that year, a misting system of 35 heads was installed to irrigate the entire area. Golden-foliaged sedges, shrubs and woody plants were incorporated to add some brightness and evergreens were also added for winter interest.

The six fern beds are laid out in such a manner to include two berms each representing ferns from Asia, Europe and North America respectively. The majority of taxa are represented by one specimen due to space restrictions. In the fall of 2003, over 20,000 minor bulbs were planted for early spring color. These include *Iris danfordiae, Scilla siberica, Puschkinia libanotica, Crocus* sp., *Chionodoxa lucileae* and *Eranthis hyemalis.*

More ferns were added in the spring of 2004. We actually lost about 15% of our ferns over the previous winter which didn't surprise us as many were rated as zone 6 ferns. Our approach to obtaining ferns for display is to find every fern taxa listed to zone 6 and try it multiple times if needed. The garden is aesthetic but will also be used for trialing. The soil is well-drained and quite organic. We are still learning about the varying requirements of these many ferns and are concerned about losing track of what we are trialing. All ferns are located with two labels (one below ground) and are mapped as well. We do feel that there may be some misidentified ferns and duplicates that have slightly different names in the trade. We will be sorting this out in 2005 and hopefully adding/replacing another 50-75 taxa.

Fiddlehead. Photo by Mark Dwyer.

ROTARY GARDENS - FERN TAXA 2003

Adiantum aleutieum
Adiantum pedatum
Adiantum pedatum 'Miss Sharples'
Arachniodes standishii
Asplenium cbenoides
Asplenium platyneuron
Asplenium scolopendrium
Asplenium scolopendrium 'Marginatum'
Asplenium scolopendrium 'Angustatum'
Asplenium scolopendrium 'Furcatum'
Asplenium scolopendrium 'Kaye's Variety'
Asplenium scolopendrium 'Laceratum Kaye'
Asplenium scolopendrium 'Undulatum'
Athyrium angustum forma rubellum 'Lady in Red'
Athyrium asplenioides
Athyrium niponicum 'Branford Beauty'
Athyrium niponicum 'Branford Rambler'

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Rotary Garden Fern Taxa *2003 continued from page 31*

Athyrium filix-femina
Athyrium filix-femina 'Cristata'
Athyrium filix-femina 'Cruciatum'
Athyrium filix-femina var. cyclosorum
Athyrium filix-femina 'Frizelliae'
Athyrium filix-femina 'Lady in Red'
Athyrium filix-femina 'Lady Victoria'
Athyrium filix-femina 'Minutissimum'
Athyrium filix-femina 'Rotstiel'
Athyrium filix-femina 'Victoriae Tall'
Athyrium hybrida 'Ghost'
Athyrium japonicum
Athyrium niponicum
Athyrium niponicum 'Pictum Burgundy Lace'
Athyrium niponicum 'Pictum Eco Dwarf'
Athyrium niponicum 'Pictum'
Athyrium niponicum 'Pictum Applecourt'
Athyrium niponicum 'Pictum Silver Falls'
Athyrium niponicum 'Pictum Samurai Sword'
Athyrium niponicum 'Pictum Ursula's Red'
Athyrium niponicum 'Pictum Wildwood Twist'
Athyrium otophorum
Athyrium otophorum 'Okanum'
Blechnum penna-marina
Blechnum spicant
Botrychium biternatum
Camptosorus rhizophyllus
Cheilanthes lanosa
Cheilanthes sinuata (Astrolepis sinuata)
Cyrtomium caryotideum 'Dwarf Holly'
Cyrtomium caryotideum
Cyrtomium falcatum 'Eco Korean Jade'
Cyrtomium falcatum 'Rochfordianum'
Cyrtomium fortunei
Cyrtomium fortunei var. intermedia
Cyrtomium macrophyllum
Cystopteris bulbifera
Cystopteris bulbifera var. crispa
Cystopteris dickeana
Cystopteris fragilis
Cystopteris protrusa
Deparia pycnosora
Diplazium conillii
Diplazium pycnocarpon
Diplazium sp. 'Eco Ming Charm'
Dryopteris affinis subsp. cambrensis
Dryopteris affinis 'Crispa Barnes'
Dryopteris affinis 'Cristata The King'
Dryopteris affinis 'Polydactyla Mapplebeek'
Dryopteris affinis 'Revolvens'
Dryopteris affinis 'Crispa Gracilis'
Dryopteris affinis 'Cristata'

Dryopteris atrata (D. eyeadina)
Dryopteris bissetiana
Dryopteris celsa
Dryopteris championii
Dryopteris clintoniana
Dryopteris crassirhizoma
Dryopteris cystolepidota
Dryopteris decipiens
Dryopteris dickinsii 'Crispa'
Dryopteris dilatata
Dryopteris dilatata 'Compacta'
Dryopteris dilatata 'Jimmy Dyce'
Dryopteris dilatata 'Lepidota Cristata'
Dryopteris dilatata 'Recurvata'
Dryopteris erythrosora
Dryopteris erythrosora 'Brilliance'
Dryopteris erythrosora 'Prolifica'
Dryopteris erythrosora 'Red Spore'
Dryopteris expansa
Dryopteris filix-mas 'Barnesii'
Dryopteris filix-mas 'Crispatissima'
Dryopteris filix-mas 'Cristata'
Dryopteris filix-mas 'Cristata Martindale'
Dryopteris filix-mas 'Grandiceps'
Dryopteris filix-mas 'Linearis'
Dryopteris filix-mas 'Linearis Congesta'
Dryopteris goldiana
Dryopteris laeera
Dryopteris lepidopoda
Dryopteris lepidopoda 'Cristata'
Dryopteris marginalis
Dryopteris oreades
Dryopteris polylepis
Dryopteris pseudo filix-mas
Dryopteris pycnopteroides
Dryopteris spinulosa
Dryopteris spinulosa 'Americana'
Dryopteris stewartii
Dryopteris tokyoensis
Dryopteris uniformis 'Cristata'
Dryopteris villarii
Dryopteris wallichiana
Dryopteris wallichiana subsp. nepalensis 'Molten Lava'
Dryopteris x australis
Dryopteris x complexa 'Rumpelstiltskin'
Dryopteris x complexa 'Stableri'
Dryopteris x complexa 'Stableri Crisped'
Dryopteris x remota
Gymnocarpium dryopteris 'Plumosum'
Lastrea decursive-pinnata (Phegopteris decursive-pinnata)

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Rotary Garden Fern Taxa 2003 *continued from page 33*

Rotary Garden Fern as Accents. Photo by Mark Dwyer.

Microlepia strigosa
Onoclea sensibilis
Osmunda cinnamomea
Osmunda claytoniana
Osmunda regalis
Osmunda regalis var. regalis
Osmunda regalis var. regalis 'Cristata'
Osmunda regalis var. spectabilis
Polypodium glycyrrhiza
Polypodium polypodioides
Polypodium vulgare
Polypodium vulgare 'Bifidum'
Polypodium vulgare 'Cornubiense'
Polypodium vulgare 'Pulcherrimum'
Polypodium virginianum
Polystichum acrostichoides
Polystichum aculeatum
Polystichum braunii
Polystichum munitum
Polystichum neolobatum
Polystichum ovato-paleaceum
Polystichum polyblepharum
Polystichum retrosopaleaceum
Polystichum rigens
Polystichum setiferum
Polystichum setiferum 'Congestum'
Polystichum setiferum 'Congestum Cristatum'
Polystichum setiferum 'Cristatum'
Polystichum setiferum 'Divisilobum'
Polystichum setiferum 'Herrenhausen'
Polystichum setiferum 'Plumoso-multilobum'
Polystichum setiferum 'Proliferum'
Polystichum setiferum 'Rotundatum Cristatum'
Polystichum tsus-simense
Polystichum setiferum 'Barfod's Dwarf'
Pteris nodulosa
Thelypteris acuminata
Thelypteris decursive pinnata
Thelypteris hexagonoptera
Thelypteris noveboracensis
Woodsia obtusa
Woodwardia areolata

ORDERING FOR 2004

Adiantum aleutieum 'Subpumilum'
Adiantum pedatum 'Eeo Aurora Borealis'
Adiantum venustum
Araehniodes simplieior 'Variegata'
Asplenium pinnatifidum
Asplenium ruta-muraria
Asplenium seolopendrium 'Cristata'
Asplenium triehomanes
Athyrium filix-femina 'Crueiato-eristatum'
Athyrium filix-femina 'Dre's Dagger'
Athyrium filix-femina 'Eneourage'
Athyrium filix-femina 'Fancy Fronds'
Athyrium filix-femina 'Vernoniae Cristatum'
Athyrium filix-femina 'Vietoriae Short'
Athyrium niponieum 'Pietum Pewter Laee'
Athyrium niponieum 'Pietum Soulmate'
Athyrium pyenoearpon
Athyrium thelypteroides
Athyrium yokoseense
Botryehium virginianum
Cheilanthes argentea
Cheilanthes tomentosa
Dryopteris affinis 'Cristata the King'
Dryopteris affinis x filix-mas
Dryopteris affinis subsp. eambrensis
Dryopteris affinis x filix-mas 'Robust'
Dryopteris earthusiana
Dryopteris x eomplexa
Dryopteris affinis 'Crispa 'Cristata'
Dryopteris eyeadina
Dryopteris dilatata 'Crispa Whiteside'
Dryopteris dilatata 'Lepidota. Cristata'
Dryopteris filix-mas
Dryopteris filix-mas 'Cristata Jaekson'
Dryopteris filix-mas 'Grandieeps Wills'
Dryopteris filix-mas 'Linearis Polydaetyla'
Dryopteris filix-mas 'Parsley'
Dryopteris filix-mas 'Undulata Robusta'
Dryopteris formosana
Dryopteris hondoensis
Dryopteris x australis
Dryopteris x bootii
Dryopteris intermedia
Dryopteris montana
Dryopteris odontoloma
Dryopteris purpurella
Dryopteris remota
Dryopteris walliehiana subsp. nepalensis
Dryopteris x eomplexa 'Robust'
Gymnoearpium dryopteris

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Ferns that Thrive in the South Carolina Piedmont
A Preliminary Report

by J. Kendall Few
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Photo by J. Kendall Few

The Enoree Fork Fern Preserve is a private nature sanctuary situated on a seventeen-acre hardwood tract in Greenville County, South Carolina. The Preserve is home to more than 10,000 hardy woodland ferns representing more than 150 different species and 200 different varieties.

The Preserve is located in USDA Zone 7b at an average elevation of 912 feet and with an average annual rainfall of 50 inches. There are 22 different varieties of hardwood including eight varieties of oak, two of hickory, tulip poplar, sweetgum, blackgum, carolina red maple, beech, sourwood, sassafrass, wild cherry, dogwood and persimmon. Other native plants include yellowroot, partridgeberry, climbing hydrangea, grandfather greybeard, pink lady slipper, carolina lily, pipsissewa, huckleberry, gooseberry, sugarberry and wild azaleas. Imported Blue Ridge Mountains plants include hemlock, galax, wild ginger, rhododendron and mountain laurel. A major expansion of our fern inventory was begun in the Fall of 2002.

Ferns indigenous to Greenville County include Christmas fern, Netted chain fern, Marsh fern, Ebony spleenwort, Cinnamon fern, Royal fern, Southern lady fern, Rattlesnake fern, Sensitive fern, Southern grape fern, Bracken fern, Resurrection fern and Hartford fern [see descriptive note on indigenous ferns below].

In addition to local nurseries, our major sources for non-indigenous ferns, listed alphabetically, are Casa Flora, D&T Nursery, Eco Gardens, Fancy Fronds, Foliage Gardens, Forest Farm, Russell Graham, Park Seed, Plant Delights, Plantworks, Roslyn and Siskiyou [see addresses below]. Based on species we have had for at least two years, **our top 25 best performing evergreen imports are:**

1. Shaggy shield fern [*Dryopteris cycadina*] - a self-propagating East Asian import which grows well under all conditions from bog to hilltop.
2. Autumn fern [*Dryopteris erythrosora*] - the spectacular Japanese sword fern,
3. Japanese wood fern [*Dryopteris pycnopteroides*] - a hardy, vigorous evergreen
4. Southern shield fern [*Dryopteris ludoviciana*] - an evergreen in our climate,

which has proved to be a spectacular bogmate and hillside, companion to the shaggy shield.

5. Soft shield fern [*Polystichum setiferum*] - a European import whose multiple variations all perform exceptionally well here.
6. Japanese tassel fern [*Polystichum polyblepharum*] - a vigorous oriental import.
7. Japanese holly fern [*Cyrtomium falcatum* 'Rochfordianum'] - a popular spectacular performer.
8. Variegated Indian holly fern [*Arachniodes simplicior* 'Variegata'] - my beautiful wife's favorite fern.
9. Korean rock fern [*Polystichum tsus-simense*] - the attractive, indestructible hardy little border fern.
10. Deer fern [*Blechnum spicant*] - another attractive border fern
11. Dixie wood fern [*Dryopteris x australis*] - an excellently performing large evergreen
12. Leathery wood fern [*Dryopteris lacera*] - a lustrous evergreen which is one of my favorites
13. Sunset fern [*Dryopteris lepidopoda*] - an absolutely spectacular specimen
14. Siebold's wood fern [*Dryopteris sieboldii*] - a beautiful, hardy Asian import of unique appearance, our rock mason's favorite fern
15. Uniform wood fern [*Dryopteris uniformis*] - another hardy Asian import also obtainable in its even more spectacular crested variation
16. Long eared holly fern [*Polystichum neolobatum*] - a slow growing yet spectacular native of Nepal, Tibet, Burma, China and Taiwan.
17. *Polystichum xiphophyllu*m - one of my own personal favorites
18. Chinese Lace Fern [*Selaginella braunii*] - the Arborvitae fern, one of our best deep shade, creekside decorations.
19. Hart's tongue fern [*Asplenium scolopendrium*] - an elegant, lime-loving fern
20. Marginal wood fern [*Dryopteris marginalis*] - a northeastern North America native that performs well here in the South [see Snyder & Bruce, *Field Guide to the Ferns . . . of Georgia* (Univ. Ga. Press 1986)].
21. Broad buckler fern [*Dryopteris dilatata* 'Lepidota Cristata'] - a small but showy forest-green fern
22. Golden scaled male fern [*Dryopteris affinis*] - an erect, adaptable, and attractive fern that does well here in several variations including:
    (a) *D. a.* 'Stableri'
    (b) *D. a.* 'Cristata the King'
    (c) *D. a.* 'Crispa Barnes'
    (d) *D. a.* 'Crispa Gracilis'
23. Clinton's wood fern [*Dryopteris clintoniana*] - a large, robust shade garden
24. *Polystichum retrosopaleaceum* - a spectacular Japanese native
25. Rock polypody [*Polypodium virginianum*] - a tiny, well mulched mound fern

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Ferns That Thrive In the South Carolina Piedmont *continued*

Wintergreen ferns which have performed well here include our indigenous Southern grape fern [*Botrychium biternatum*], the Common polypody [*Polypodium vulgare*], the Welsh polypody [*Polypodium cambricum*], and two variations of the common polypody: the crested common polypody [*P. v.* 'Bifido-cristatum'] and the robust common polypody [*P. v.* 'Pulcherrimum'].

Our top15 deciduous fern imports are:

1. Japanese beech fern [*Thelypteris decursive-pinnata*] - a vigorous bright green East Asian beauty.
2. European lady fern [*Athyrium filix-femina*] - an attractive feathery fern with multiple variations.
3. Northern maidenhair [*Adiantum pedatum*] - the distinctive Five-Finger fern native to the Eastern United States and Canada.
4. Japanese Painted Fern [*Athyrium niponicum* 'Pictum'] - this universally popular fern appears to do as well in our garden as it does elsewhere.
5. American ostrich fern [*Matteuccia pensylvanica*] - whether or not there are consistent differences between European and American plants [Mickel *222*], thus far this fern has outperformed its European cousin [*M. struthiopteris*] here by a wide margin.
6. Auriculate lady fern [*Athyrium otophorum*] – this fern is one of our proudest possessions.
7. Tokyo wood fern [*Dryopteris tokyoensis*] - like many other ferns of Japanese origin this large and vigorous forest green fern has done exceptionally well here.
8. Ghost fern [*Athyrium x* 'Ghost'] - this relatively new hybrid painted fern is an excellent performer in our creekside shade garden.
9. Southern wood fern [*Thelypteris kunthii* or *Dryopteris normalis*] - also known as the widespread maiden fern [see Snyder & Bruce, *Field Guide to the Ferns . . . of Georgia* (Univ. Ga. Press 1986)], the river fern or the southern maiden fern [Mickel, *Ferns for American Gardens* (Timber Press 2003)]. Thus far our southern wood ferns appear to do best in deep shade.
10. American glade fern [*Diplazium pycnocarpon*] - we have a 70% survival rate on root- ball ferns obtained of this species. All of the survivors are thriving nicely in our deep shade Glade Garden.
11. Male ferns [*Dryopteris affinis* and *Dryopteris filix-mas*] - several variations of both of these species have all done well here.
12. Goldie's wood fern [*Dryopteris goldiana*] - Although a slow starter, this fern has become a special attraction here this fall.
13. Rigid buckler fern [*Dryopteris villarii* or *D. nindshelkensis*] - ferns of this species are excellent performers in our Wood Fern section.
14. Gemiferous Spikemoss [*Selaginella moellendorffii*] - although Hoshizaki & Moran's *Fern Grower's Manual* (Timber Press 2001) describes this spectacular lace fern as semi-tender, ferns of this species have all done well thus far.
15. Japanese climbing fern [*Lygodium japonicum*] - in our small rainwater trellis garden, we have placed this fern in a side-by-side Olympic climbing competition

with our own indigenous Hartford Fern, and, despite all of our patriotic efforts to the contrary, the Japanese Climbing Fern currently holds a slight lead.

Recent acquisitions, which have shown great promise thus far, include:

1. Lace fern [*Microlepia strigosa*] - if this fern can survive our Zone 7b winters, it promises to become one of our most spectacular species.
2. Taiwanese holly fern, - our name for the spectacular leather-green *Arachniodes cavalerii*
3. Mariana maiden fern [*Thelypteris* (or *Macrothelypteris*) *torresiana*] - a thus-far vigorous specimen that Hoshizaki & Moran describe as semi-hardy in Zones 7 & 8.
4. Japanese shield fern [*Polystichum ovato-palaeceum*] - our name for this brilliant forest-green fern.
5. *Polystichum* (aff) *squarrosum*, a spectacular narrow forest green evergreen appears to our untrained eye to be identical to the spiny holly fern *[Polystichum* Sp.].
6. Cascading holly fern [*Polystichum lentum*] - an attractive evergreen
7. Oriental royal fern [*Osmunda japonica*] - a wide wingspan, thick-stemmed beauty from Mount Emei in Japan.
8. Japanese felt fern [*Pyrrosia lingua*] - a uniquely different selection
9. Upside-Down fern [*Arachniodes standishii*] - a brilliant lacy evergreen
10. Virginia chain fern [*Woodwardia virginica*] - a beautiful black-stemmed fern

Ferns which have not performed consistently well thus far in our Preserve include:

1. Giant chain fern [*Woodwardia fimbriata*]
2. Oak fern [*Gymnocarpium dryopteris*]
3. Wavy cloak fern [*Astrolepis sinuata*]
4. Hard shield fern [*Polystichum aculeatum*]
5. Western sword fern [*Polystichum munitum*]

Photo by J. Kendall Few

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Ferns That Thrive In the South Carolina Piedmont *continued*

6. Maidenhair spleenwort [*Asplenium trichomanes*]
7. Northern and Southern beech ferns [*Thelypteris phegopteris* and *Thelypteris hexagonoptera*]
8. Purple cliff brake [*Pellaea atropurpurea*]
9. Alpine water fern [*Blechnum penna-marina*]
10. The Lip ferns [*Cheilanthes lanosa* and *C. tomentosa*]

Our oldest fern is a 300 million year old fossil, *Alethopteris pennsylvania* [see Rhodes, *Fossils, A guide to Prehistoric Life*, p. 153, (Golden Books 1962)] contributed by Travis Pittman, whose parents began our stoneworks in 1984. Known locally as the Joe DiMaggio of rock masons, Travis also serves as custodian of our fern preserve and is the sole source of our off-site indigenous ferns. We have initiated a concerted effort to save Greenville County's endangered indigenous ferns from destruction where previously undisturbed areas are converted to residential and commercial use.

When we rescued our own little wilderness area from the threat of urban sprawl in 1984, after draining the Alder Bog, our on-site indigenous ferns blossomed forth in great profusion, including:

1. Our beautiful evergreen creekbank decoration, the Christmas fern [*Polystichum acrostichoides*].
2. Our deciduous bog ferns:
   (a) Netted chain fern [*Woodwardia areolata*]
   (b) Marsh fern [*Thelypteris palustris*]

Later, at higher elevations, we have found a limited number of Ebony spleenwort [*Asplenium platyneuron*], whose supply has been abundantly supplemented by Travis Pittman.

All of our off-site indigenous ferns have come from upper Greenville County, in the Travelers Rest/Glassy Mountain area in a fern-swap program with Travis Pittman. These ferns, all of which have performed well here, include:

1. Evergreen Ferns

   (a) Hartford Fern [*Lygodium palmatum*] - our rainwater loving American climbing fern protected by the Connecticut legislature in 1869 [Snyder & Bruce, supra, p. 46].

   (b) Resurrection fern [*Polypodium polypodioides*] - our resilient evergreen tree-climbing fern [*Snyder & Bruce, supra*, p. 42], also found on a live-oak limb near the Epcot Norway pavilion at Walt Disney World in Orlando.
2. Wintergreen Ferns

   (a) Southern grape fern [*Botrychium biternatum*] - common throughout the Piedmont sections of South Carolina and Georgia, [*Snyder & Bruce, supra,* p. 22]
3. Deciduous Ferns

   (a) Cinnamon fern [*Osmunda cinnamomea*] - one of our largest and most impressive species [*Snyder & Bruce, supra,* p. 34],

(b) Southern lady fern [*Athyrium asplenioides*] - one of the most abundant ferns found in this area [*Snyder & Bruce, supra*, p. 114].

(c) Royal fern [*Osmunda regalis*] - a vigorous bog and shade fern [*Snyder & Bruce, supra*, p. 38].

(d) Sensitive fern [*Onoclea sensibilis*] - another bog and shade fern which also does well in our small rainwater trellis garden [*Snyder & Bruce, supra*, p. 132]

(e) Rattlesnake fern [*Botrychium virginiamum*] - a very attractive small fern described as difficult to cultivate by Mickel, but which has grown exceptionally well here thus far [*Snyder & Bruce, supra*, p. 14]

(f) Bracken fern [*Pteridium aquilinum*] - the giant sun-loving fern found in almost every county of Georgia [*Snyder & Bruce, supra*, p. 72], which Travis Pittman obtained on his parents' property near Glassy Mountain

Although our Preserve is still in its developmental stage, and is not expected to be opened to selected small groups until the summer of 2006, we would welcome pre-arranged visits by interested individuals. Copies of our Existing Species List including a list of native habitats, references and sources can also be obtained by contacting Kelli Shellenbarger at (864) 232-6456.

Fern Source List

Acme Nursery P.O. Box 242, McMinnville, TN 37110

Carter & Holmes P.O. Box 668, Newberry, SC 29108

Casa Flora P.O. Box 41140, Dallas, TX 75241 - (wholesale only)

D&T Nursery HCR77 Box 125 Altamont, TN 37301

Earthly Pursuits 2901 Kuntz Road, Windsor Mill, MD 21244

Eco Gardens P.O. Box 1227, Decatur, GA 30031 – List $1.00

Fancy Fronds P.O. Box 1090, Gold Bar, WA 98251 – Catalog $2.00

Foliage Gardens 2003 128th Avenue S.E., Bellevue, WA 98005 – Catalog $2.00

Forest Farm 990 Tetherow Road, Williams, OR 97544 – Catalog $3.00

Russell Graham, Purveyor of Plants 4030 Eagle Crest Road N.W., Salem, OR 97304 – Catalog $2.00

Park Seed Company 1 Parkton Avenue, Greenwood, SC 29647

Plant Delights Nursery 9241 Sauls Road, Raleigh, NC 27603 Catalog 10 stamps or a box of chocolates

Plantworks Nursery 5851 Kiger Road, Rougemont, NC 27572

Roslyn Nursery 211 Burrs Lane, Dix Hills, NY 11746 Catalog $3.00

Siskiyou Rare Plant Nursery 2825 Cummings Road, Medford, OR 97501 Catalog $2.00

Andre Viette Farm and Nursery Route 1, Box 16, Fisherville, VA 22939 Catalog $2.00

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Photo by J. Kendall Few

References

1. Mickel, *Ferns for American Gardens* (Timber Press 2003)
2. Hoshizaki & Moran, *Fern Grower's Manual* (Timber Press 2001)
3. Snyder & Bruce, *Field Guide to the Ferns and Other Pteridophytes of Georgia* (Univ. Ga. Press 1986)
4. Burrell, *Ferns: Wild Things Make a Comeback in the Garden* (Brooklyn Botanic Garden 1994)
5. Lellinger, *A Field Manual of the Ferns and Fern-Allies of the United States and Canada* (Smithsonian Institution Press 1985)
6. Cobb, *Peterson Field Guides: A Field Guide to Ferns and Their Related Families* (Houghton Mifflin Company 1956, 1963)
7. Rickard, *The Plantfinder's Guide to Garden Ferns* (Timber Press 2000, 2002)
8. Jones, *Encylopaedia of Ferns* (Thomas C. Lothian Pty. Ltd. 1987)

Growing Ferns in a Cold Climate *continued from page 14*

earliest are ***Polystichum makinoi, Dryopteris crassirhizoma*** and ***D. lacera***, all of which are first seen to develop by the beginning of April.

Early development causes problems when there are late frosts. In 1996 we went to Thailand at the beginning of May, exactly when an especially deep, quick freeze hit Binghamton. When we returned three weeks later we found several early ferns brown and moribund. None were dead, however, and the exotics (***Polystichum makinoi*** and ***Dryopteris crassirhizoma***) recovered very quickly. The natives fared more poorly, and one ancient ***Dryopteris marginalis*** that had reached a fine size (19 fronds) struggled back with only seven fronds that year. Eight years later it has reached 13 fronds and is beginning to look like its previous glorious self. Oddly, the fern that did the most poorly was a lady fern that I hadn't even planted. I thought it was gone for good, but four years later a tiny frond reappeared.

By mid summer several ferns are starting to "crisp up" including the ***Osmunda cinnamonea*** and ***O. claytoniana, Matteuccia struthiopteris, Adiantum pedatum***, and ***Diplazium pycnocarpon***. On wet years, such as the record-setting 2004, all our ferns remain thoroughly green (except for the ostrich ferns) until the first freeze in October. Even with our climatic variability and unpredictability, fern growing is a rewarding adventure; hopefully these notes will spur others in this cold climate to give them a try.

Fern Cultivation in Northern Utah *continued from page 21*

it did not seem to like its new surroundings and soon died out. I have not attempted any natives since. *W. polystichoides* from Japan did miserably. Low humidity is a problem for this last one.

Woodwardia – Two species have been attempted in my garden, *W. radicans* from Europe and *W. fimbriata*, the pacific west coast giant chain fern. Neither did well at all, being very temperamental. *W. fimbriata* did survive two winters but ultimately succumbed. It is worth noting that *W. fimbriata* was at one time native to Utah, reported as rarely occurring in the Raft River Mountains at the extreme northwest corner of the state.

Ferns in Pittsburgh Gardens

Joan Gottlieb
Pittsburgh, PA

Pittsburgh, PA, located in Allegheny County, southwestern Pennsylvania is a Zone 5 growth area, but is borderline Zone 6. Many marginally hardy ferns do well here if given winter protection. My entire garden is given a light fertilizing with an all-purpose plant food like 10-10-10 before frond emergence, in mid- to late March. Then, in the fall, all ferns (with special attention to the Zone 6 species) are heavily mulched with a 4-5 inch thick "skirt" of chipped leaves. I am careful to avoid oak leaves when mulching the calciphiles in my lime cobble and I do not compress the mulch. Light and airy seems to be the best texture. The mulch typically decomposes over the winter, but any that remains is pulled back from fern crowns in the spring.

Every garden has microhabitats. My small, suburban lot has poorly drained wet spots, dry areas, level expanses, sloped (rock garden) sites, shady zones near and under trees and sunnier, more open locales. The first job of the gardener is to survey his property and fit his/her plantings to the available environmental conditions. It is, of course, possible to re-shape those conditions, but considerable work is required. For example, acidic bog areas or alkaline cobbles can be created to meet the specific growth requirements of plants found in such areas in the wild. For many "lime-loving" ferns (e.g. hart's tongue, walking) ordinary woodland soils in partial shade suffice with some crumbled mortar, dolomitic limestone (a sedimentary rock with both calcium and magnesium content) or crushed eggshells spread around from time to time. Mini-cobbles can be created by "planting" limestone rocks throughout the area and mixing agricultural or dolomitic limestone with the soil to a depth of 10-12 inches. After a year of conditioning, the area is ready for planting with an annual top dressing of pelletized or pulverized limestone. Some "limestone" species are not so much dependent on alkaline soils or rocks as they are tolerant of these conditions, giving them a competitive advantage in these habitats in the wild. Acid-loving species (e.g. mountain spleenwort, deer fern) can be accommodated similarly with lots of granite or sandstone rock and placement away from any source of lime such as the foundation of a house or a natural limestone outcrop. The addition of peat moss or sulphates will "acidify" soils that are too basic. Soil tests are available through many garden centers or agriculture extension services, but most ferns thrive in ordinary garden soils and no fussing is required.

Ferns are fibrous-rooted plants and, like rhododendrons, are best planted in a "bed", rather than a "hole". For most ground species I dig an over-sized, shallow bed (6-8" deep) and mix the excavated soil (clay and rock removed) with lots of leaf compost and some coarse river sand. After orienting the fern and placing some strategic rocks around it, I backfill the bed and water it well. I label the fern, assign it a number, and make up a 3x5" card noting its number, common and scientific name, date and source of acquisition, location in the garden and any unusual growth requirements. During their first season in the garden new ferns receive additional watering during dry spells. Soils in western PA are naturally acidic (pH 5-6) and lie on top of thick clay layers. This is fine for most of the ferns that are hardy here. Rock walls made of shale, sandstone or limestone are commonly used to deal with the uneven terrain and can accommodate

polypodiums, aspleniums and pellaeas, giving these rock lovers the long, cool, root runs they require. Slugs and snails can be a problem for young ferns, but are easily controlled with a generous sprinkling of diatomaceous earth (wear a respiratory mask when applying) or iron phosphate products like "Sluggo" and "Escar-go". Chipmunks, moles and other burrowing mammals can undermine ferns in rock walls and periodic backfilling may be required. Another problem for fern growers in western PA is the freeze-thaw cycling of our winters. This tends to heave ferns out of their "beds" or force them up above the soil line. Rocks and heavy mulching help minimize this, but a sharp eye each spring, before crosiers emerge, alerts me to plants that need to be reset. It is also an opportunity to divide ferns that have produced multiple crowns and pot them up as gifts. A serrated knife makes a clean cut straight down between the crowns with lots of roots left intact for each separated plant.

Following the guidelines above, the ferns listed below have thrived in my garden for 5 years or more (many for over 20) and are not difficult to grow when planted as described above, except as noted by the following abbreviations:

M – needs extra mulch or protection over the winter; marginally hardy in Zone 5.

W – must have soil that is kept uniformly moist; wetland species

D – requires excellent drainage (lots of coarse sand or grit in the planting mix)

S – likes at least a few hours of sunlight each day

SP – must have some sun protection (light shade)

R – rock species; needs to grow in humusy spaces between or on top of porous, moist rocks.

SL – loved by slugs and snails.

(NA) = North American native; (A) = Asian; (E) = European.

Adiantum

aleuticum (western maidenhair) – robust and drought hardy when established (NA). The dwarf *A. a.* 'Subpumilum' tends to die out in my garden and is not a strong grower here.

pedatum (northern maidenhair) – SP– needs moist, well-drained, limy soil and is not as lush and large as *A. aleuticum* (NA). *A. p.* 'Miss Sharples' with lobed pinnules is also vigorous in my garden

venustum (Himalayan maidenhair) –SP, M - semi-evergreen; gorgeous ground-cover (A).

Arachniodes

standishii (upside-down fern) –SP, M - feathery beauty with prominent veins. It is somewhat late to leaf out, and hard hit by a recent cold winter, but reliable (A).

Asplenium

platyneuron (ebony spleenwort) –SP, D- needs gritty, dryish humus among rocks (NA).

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Ferns in Pittsburgh Gardens *continued from page 45*

trichomanes (maidenhair spleenwort) –SP, R-must be rooted securely among limestone or slate rocks that can be kept shaded and moist (NA).

Athyrium

filix-femina (American lady fern) – elegant, large-fronded, easy-to-grow in moist woodland soil. All three native varieties –*angustum, asplenioides*, and *cyclosorum* grow in my garden, with *cyclosorum* being the largest. The typically green-stalked *angustum* is also available as a handsome, red-stalked form *rubellum* (NA).

filix-femina (European lady fern) – available in many forms popular in Victorian England. The ones that grow well for me are 'Victoriae' (crisscrossed pinnae), 'Frizelliae' (tatting fern – pinnae reduced to nubbins), 'Minutissimum' (which can be larger than its name implies when grown in rich soil), and 'Percristatum' (pinna and pinnule tips crested, making the fronds heavy and easily bent over (E).

niponicum (Japanese lady fern [*A .iseanum*]) –M– delicate and slow growing, unlike the more colorful varieties 'Pictum' and 'Pictum Giant,' and its color intense, purported hybrids with *A. filix-femina* known as 'Branford Beauty,' and 'Ghost.' All are great garden ferns, developing the best color in good light (A).

otophorum (eared lady fern) – striking for its large, lime green fronds and burgundy stipes and veins. It is slow to emerge (mid-May), but worth the wait (A).

Blechnum

spicant (deer fern) – forms a tight clump of narrow, arching, wintergreen sterile fronds and separate, erect fertile ones. It needs lime-free, humusy soil and needs to be "reset" periodically as it tends to heave up from the soil (NA; E)

Cyrtomium

falcatum var. Eco Korean Jade (dwarf holly fern) –M, SP- Although *C. falcatum* is not hardy here, this charming, low-growing dwarf is wintergreen and reliable in the shaded lime cobble (A).

falcatum X caryotideum (hybrid holly fern) – M, SP – grows slowly in part shade and humusy soil; a good-looking fern with the shape of *C. caryotideum* and the elegance of *C. falcatum*, although neither parent survives our winters reliably(A).

fortunei –M, SP – tall, semi-wintergreen fronds with narrow pinnae (no auricles) make this a favorite for shaded, humusy soil, although the slightly smaller (fewer pinnae) var. *intermedia* thrives in the lime cobble (A).

lonchitoides – M, SP- small gem; rounded pinnae set close together; late to emerge (A). *macrophyllum* (large-leaf holly fern) –M, SP –large, evergreen, broad pinnae (A).

Cystopteris

bulbifera (bulblet bladder fern) – narrow, very long, pale green fronds with bulblets along the rachis that drop off and propagate the fern making a sizable colony. It likes a little lime, some sun and moist soil, but adapts well to a variety of conditions (NA).

protrusa (bladder fern) –SP - delicate fronds tend to brown during summer; among the earliest ferns to emerge each spring (NA).

X *tennesseensis* (Tennessee bladder fern) –SP- the beautiful, lime-green hybrid between the two species listed above. It has the basic frond shape of its *C. protrusa* parent and a few bulblets, like its *C. bulbifera* parent, propagating asexually quite well and demonstrating robust, hybrid vigor (NA).

Dennstaedtia

punctilobula (hay-scented fern) –S- invasive rhizomes, but excellent cover plant for a sunny slope or a contained garden area; somewhat difficult to establish from adult transplants (NA).

Deparia

acrostichoides (silvery glade fern) -SP– a damp woodland species with tall, hairy fronds and elongated, silvery indusia. Give it room to clump and spread (NA).

Diplazium

pycnocarpon (glade fern) –SP- a short-creeping, damp woodland fern with dark green, once-pinnate fronds; does best in neutral to slightly alkaline soils (NA).

Dryopteris

affinis (scaly male fern) – a magnificent, huge, multiple-crowned, clumping fern with abundant golden-brown scales that make it look "shaggy". It is not at all fussy, thriving in sun or partial shade, acidic and alkaline soils; but it does need space. I have the 'Cambrensis' sub-type, along with several varieties, incl. 'Crispa Gracilis', 'Cristata' (also called "the king"), 'Cristata Angustata', 'Rumplestilskin', and 'Stableri'; all are garden delights of smaller, more manageable proportions (E).

X *australis* (Dixie wood fern) -SP– a sterile hybrid of *D. celsa* and *D. ludoviciana,* easy to propagate by division of the rhizome branches; a slender, lustrous beauty (NA).

bissetiana (beaded wood fern) -SP– late-emerging wintergreen for moist woods (A).

blanfordii (Blanford's wood fern) – SP- wintergreen; looks like *D. filix-mas* (A).

campyloptera (mountain wood fern) – SP- fertile hybrid of *D. expansa* X *D. intermedia* with broadly triangular fronds and very asymmetrical basal pinnules (NA).

carthusiana (spinulose wood fern) – winter deciduous, no glandular hairs (cf. *D. intermedia*); gorgeous fern for all spots (NA).

caucasica – SP- resembles and is a parent of *D. filix-mas;* pinnules more toothed, and paler, with a tall, arching growth pattern (Caucasus).

celsa (log fern) –W, SP- fertile hybrid between *D. goldiana* and *D. ludoviciana*; tall, dark, shiny fronds; only top third of pinnae are fertile. It needs moist, acidic soil (NA).

championii (Champion's wood fern) – broad, triangular, glossy, wintergreen leaves (A).

clintoniana (Clinton's wood fern) -SP – fertile hybrid of *D. goldiana* X *D. cristata;* looks like a slim Goldie's fern with broad basal pinnae. Protect from wind (NA).

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Ferns in Pittsburgh Gardens *continued from page 47*

X *complexa* - extremely robust hybrid between *D. affinis* and *D. filix-mas*; very scaly. var. 'Rumpelstilskin' is an interesting, congested-looking plant (E).

crispifolia –M– rare charmer with undulate, crisped pinna margins; I mulch it heavily in winter and have it nestled against the northwest corner of the house (Azores).

cristata (crested wood fern) –W, SP– nothing crested about this misnamed fern, but its elegant, stiffly-narrow fronds and triangular-shaped pinnae turned 90° from the rachis (like the vanes of open venetian-blinds) make it one of my favorites. To attain its full stature and beauty it needs moist, rich soil. Young fronds are easily broken or deformed, so I am very careful in late spring when they emerge.

cycadina (black or shaggy wood fern) –M, SP– striking crosiers with black scales on stipe and rachis make a beautiful circle of dark green, once-pinnate, erect fronds (A).

dickinsii –M– similar to *D. cycadina* in growth form and once-pinnate structure, but pinnae are broader and paler. The cultivar 'Crispa' has lobed margins (A).

dilatata (broad buckler fern) -SP– a feathery beauty with several interesting varieties – 'Crispa Whiteside,' 'Jimmy Dyce' (a miniature), 'Lepidota Cristata' and 'Recurved' are my favorites. They like acidic soils with lots of added compost.

erythrosora (autumn fern) – S-the red sori give it its species name and the bronze color of its young fronds describe its common name. It is wintergreen, easy to grow and attractive in all its varieties - "small form," 'Gracilis,' and 'Prolifica' (skeletonized pinnae) in my garden (A).

expansa (alpine buckler fern) – one of the parents of *D. campyloptera* and reputed to be only 6" in an alpine habitat. I love its thin, lime-green foliage and airy look in the acidic rockery (NA, E).

filix-mas (male fern) – SP- a confusing species, it looks like *D. affinis* except for being deciduous and lacking the dark spot at the base of the pinnae undersides. The European form is the more common one in both nature and the trade. The American form is a rather rare fern of limestone rock in northeastern NA. In the garden both are adaptable and easily grown in a woodsy, shaded location or in a limestone cobble. There is also a western male fern of unknown origin. Double rows of sori on the tip pinnae are distinctive. I grow several of its many European cultivars – 'Barnesii,' 'Crispatissima,' 'Grandiceps,' 'Multicristata,' 'Linearis Polydactyla' and 'Linearis Congesta' (E, NA).

formosana (Formosan wood fern) –M– broad fronds and very long basiscopic pinnules. It emerges late, but fronds persist well into winter (A). goldiana (Goldie's wood fern) –W, SP– our largest native Dryopteris. It has huge, dark blue-green pinnate-pinnatifid fronds and grows in moist soil, partial shade (NA).

hondoensis –SP- a beautiful wintergreen fern, with large, arching leaves; one of my favorites for a partially shaded area or around a water feature (A).

indusiata – a large fern that resembles *D. erythrosora* so much I am not sure I can tell the difference. My plant has origins in the Gassner garden in Germany.

intermedia – wintergreen, all purpose native fern with numerous glandular hairs on the underside of the fronds, especially the rachis (cf. *D. carthusiana*) (NA).

laeta (bright wood fern) –SP- semi-evergreen, large, triangular-shaped fronds make this a beauty almost anywhere in the shade garden (A).

lepidopoda –SP- semi-wintergreen beauty with black scales like *D. wallichiana*, but with rose colored young fronds. Put a large rock behind it for a special effect (A).

ludoviciana (southern wood fern) – W, M – semi-wintergreen parent (along with *D. goldiana*) of *D. celsa*. Tall, glossy, dark green fronds, fertile at the top third, make this a desirable addition to the moist shade garden. I mulch this southerly beauty well for our winters, but it is reliably hardy (NA).

marginalis (marginal wood fern) –SP- a sturdy, leathery-leaved native of our PA. woods, tolerant of drought and deep shade. The plant grows single-crowned, with sori borne along the outer edges of the pinnules; wintergreen (NA).

muenchii –M, SP– this fern of cool forests in the mountains of Mexico appears to be hardy in my garden, at least in a protected spot alongside the house. Fronds are thin-textured so I try to give it an extra drink during dry spells.

nipponensis –SP- a *D. erythrosora* type with red-tinted new leaves and lime-green, arching, wintergreen adult fronds. It is extremely attractive and reliable (A).

oreades (mountain male fern or dwarf male fern) –SP- resembles small-sized *D. filix-mas* plants, although it has grown to an impressive size in my lime cobble. I have it in non-lime soil as well, so it is quite adaptable, but does like good drainage. Cv. 'Crispa' is a beautiful, wavy-edged, tightly-fronded form that is a real winner (E).

polylepis (scaly wood fern) –M, SP– stout stipes hold up the apple-green, pinnate-pinnatifid fronds well, forming an attractive whorl of leaves. Mulch well (A).

pseudo-filix-mas (Mexican wood or male fern) –M, SP- This rare, high elevation fern of Mexico is fully hardy in my garden and produces a tall crown of fronds, adding new leaves slowly until frost.

pycnopteroides –M– a shiny-leaved fern with pinnate-pinnatifid leaves and slender pinnae that form a broad, elegant crown. It is similar to *D. cycadina*, but has many more fronds in its crown, and pinnae that are more deeply scalloped. Mulch well (A).

X *remota* – a large fern with 2-3' fronds that arch into an impressive crown. It is a fertile hybrid between *D. affinis* and *D. expansa* and has the shaggy scales of the former along with the delicate pinnation and texture of the latter (E).

sieboldii (Siebold's wood fern) –M, SP– I love turning over the fertile, spring fronds of this unusual species to prove to friends that it is, indeed, a fern. The broad, leathery, simple pinnae have a bold look. Vegetative leaves are produced all summer, but this is a slow-growing, elegant fern that requires patience (it emerges late) and lots of winter mulch. To me, well worth it! (A).

X *sjoegrenii* –M, SP– a hybrid between *D. azorica* and *D. dilatata*, this feathery-looking fern clearly has inherited the best of both parents. With winter protection it appears to be hardy here.

sublacera – SP- wintergreen, leathery-textured, robust plant that grows luxuriantly in compost-enriched soil and a bit of shade. The frond undersides are silvery-green (A).

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tokyoensis (Tokyo wood fern) –M, SP– a distinctively narrow-fronded, once-pinnate, pinnatifid fern with a symmetrical growth form. Mulch well for winter (A).

uniformis –SP- This is a winner for its bright apple-green fronds that form a vase-shape. It is a medium-sized fern of wooded mountains, and must have some shade. Cv. 'Cristata' is variably forked and crested - interesting (A).

varia –M- Bipinnate fronds transition to tripinnate at the base; leathery and dark green beauty. It has been reliably hardy for me (A).

wallichiana (Wallich's wood fern) –M– a high elevation fern from Mexico to Madagascar; I saw it in the cold, misty páramo of Costa Rica. Richard Rush describes it as "charmingly sinister," alluding to its lustrous yellow-green crosiers wrapped in large, black scales. The fronds can be 4' long and appear slowly all season, "shuttle-cock" fashion. They are subject to aborting half-way through uncoiling. Mulch for winter!

Equisetum

arvense (field horsetail) –S- Aggressive and useful only where it can be confined, but has interesting pinkish-brown fertile stems (with cones) in early spring as well as green, shaggy-branched stems all summer. It is naturalized around my pond (NA).

X *ferrissii* –SP- This hybrid between *E. hyemale* and *E, laevigatum* is a native of PA wet woods and has unbranched aerial stems that remain wintergreen at the base. It is not invasive, but comes up at intervals all over my lime cobble – a nice effect (NA).

*hyemale (*rough scouring rush) –S- grows luxuriantly once established. This handsome, dense-growing native likes damp or wet soils in full sun. It can be grown in a container in gardens or ponds with limited space (like mine) (NA).

scirpoides (dwarf scouring rush) –W, SP- everyone's favorite, only 4-6" tall, with skinny, twisty, wintergreen stems that form lovely clumps in damp, limy woods. It also makes an interesting potted plant for a shallow pond (NA, E, A).

Gymnocarpium

dryopteris (oak fern) –SP- my nomination for most charming fern. It makes a lime-green ground cover in cool, moist, acidic soil and has delicate, 3-parted fronds that come up from shallow-growing rhizomes. Comes easily from spores (NA, E, A).

robertianum (limestone or Robert's oak fern) – SP- A larger, darker leaved fern than *G. dryopteris* with other, more technical differences, but this one is rare in NA and is found in calcareous swamps (fens). It grows easily in my lime cobble (NA, E, A).

Matteuccia

struthiopteris (ostrich fern) –W- This is my all-purpose fern for any moist, shady area that needs some quick green. Its upright buds produce vase-shaped clumps of plume-like vegetative fronds, followed by shorter, woody fertile spikes in late summer. Underground runners form new plants, so, if space is limited, these will have to be pruned back, but I love the "bedding" effect, and I always have plants

to give away. Ostrich ferns must be kept moist and love a dressing of compost in the fall (NA).

Onoclea

sensibilis (sensitive fern) –W- I like this fern for the moist, shady woodland. It forms a lovely, low border in front of Matteuccia, to which it is related, but is a fast grower, so I keep an eye on it. The woody fertile spikes are great in dried arrangements (NA).

Osmunda

cinnamomea (cinnamon fern) –W- Every temperate-zone garden should have a few clumps of this native. Its fuzzy white crosiers are harbingers of spring and uncoil into green, then cinnamon-colored, grape-like fertile spikes, followed by a crown of tall, green fronds. It grows in sunny spots or partial shade, but must have damp soil. Its roots form a tangled, tough, woody mass, making division a character-builder (NA).

claytoniana (interrupted fern) – In a sunny location where the soil is rich and stays somewhat moist, large clumps of this species make eye-catching foils for fences, house foundations or as perennial bed backdrops. Only the mid-section pinnae are fertile, turning brown after spore release. It is tolerant of drought once established (NA).

japonica –M- This species is fully hardy, easy to grow and much more drough tolerant than its relative – our native royal fern (*O. regalis*). Although the two species are casual look-alikes, *O. japonica* is more leathery-fronded and is fully dimorphic (has completely separate fertile and vegetative leaves, like O. cinnamomea) (A).

regalis –W– Tall, regal and thirsty, this spectacular native grows in or near wetlands and its frond tips will crisp and brown if allowed to dry out. In spring the frond tips are completely fertile, like crowns on the green pinnae below. For damp soils where there is sun part of the day this is a must-grow species. I also enjoy several of its many varieties: 'compacta' (a small, naturally occurring ecotype that breeds true), 'purpurascens' (huge with purple stipes), 'gracilis' (a charming miniature), and 'undulatifolia' (wavy pinna edges) (NA).

Phegopteris

connectilis (northern beech fern) –SP- A short-creeping ground cover fern for cool, moist soil with good drainage. I have a well-established, spreading mat of it at the top of my rock garden where its jaunty, light-green fronds delight me with their long, forward-pointing, lower pinnae (NA, E, A).

hexagonoptera (broad beech fern) –SP- Taller and broader than *P. connectilis*, it has much the same "look", but its rhizomes are more rampant and slugs find it appealing in summer (NA).

Phyllitis

scolopendrium (hart's-tongue fern) –M, R– I have both the diploid European var. 'scolopendrium' (called "scolies" in Britain) and the rare tetraploid American var. 'americanum' grown easily from a few spores collected on the Bruce Peninsula in Ontario, Canada. Both are wintergreen and grow well in my lime cobble with fall

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mulching and good drainage provided by a natural slope and lots of limestone rocks and chips worked into the soil. Specimens transplanted to neutral or slightly acidic parts of the garden do well, but are not as large. The European variety is available in the trade along with more than two dozen forms, not all of which show equal hardiness in my garden. I have had excellent results with 'Kaye's Lacerate,' 'Crispum,' 'Ramo-marginatum,' 'Linearis,' and 'Sagittatum-cristatum' (NA, E).

Polystichum

acrostichoides (Christmas fern) –SP- a must for every garden in this, its native area. It is reliably wintergreen, and its glossy, dark, once-pinnate fronds are stiffly erect, slim and fertile at the top third. Tolerant of drought, growing well on slopes, it is an all-purpose beauty, but grown in a moist, shaded woodland setting, it can be spectacular. I do not cut off the old, functional leaves until new ones are completely unfurled (NA).

aculeatum (hard shield fern) – This beauty resembles a coarse, stiff P. setiferum. It is reputed to like some lime, but my specimens grow quite well in ordinary, woodland soil. I give it lots of mulch in the fall, and it remains wintergreen (E).

braunii (Braun's holly fern) –SP- This large native of our northern woods has silvery fiddleheads and tall, bipinnate fronds that taper at the base and make an impressive crown. The only problem is its tendency to unfurl prematurely in our unpredictable spring. I cover the early crosiers with a basket to insulate them if frost is expected overnight (NA, E, A).

deltodon –M, SP– This tiny species has been reliably hardy and wintergreen, with fall mulching, in the lime cobble. It likes good drainage and some sun, but does not like to dry out (A).

X *illyricum* (alpine hybrid shield fern) –SP- A sterile hybrid between *P. aculeatum* and *P. lonchitis* that has lance-shaped leaves like P. lonchitis but withstands our hot summers better. Pinnate-pinnatifid fronds are half-way between its parent types; (E).

X lonchitiforme – This sterile hybrid between *P. lonchitis* and *P. setiferum* has the best qualities of both parents, including impressively spiny pinnae and a wintergreen growth habit. Unlike *P. lonchitis,* it does not seem to mind our hot, dry summers (E).

makinoi (Makino's holly fern) – This has been a great rock garden fern, growing handsomely among large rocks. Tan scales contrast nicely with lustrous green, bipinnate fronds (A).

piceopaleaceum –M, SP- Surprisingly hardy here, nestled against the house foundation in a protected, shady location. I mulch it especially well in the fall and like it for its glossy, dark-green fronds (A).

polyblepharum – Japanese tassel fern –M, SP– an irresistible favorite for its circle of shiny leaves and bristle like, golden scales. It likes lots of compost, fall mulching, and moist soil. In a severe winter the central crown may die, but side buds will regenerate the plant. It has the same problem as *P. braunii* - a

tendency to unfurl too early; protect over frosty nights.

setiferum (soft shield fern) –M. SP- the species that gives ferns their "feathery" reputation. The soft, bipinnate fronds tend to droop and spread out in a beautiful circle. It is semi-wintergreen here and somewhat late to leaf out in spring. Some of its many cultivars that I have and enjoy are 'Grandiceps' (very large; somewhat coarse), 'Lineare' (airy, widely-spaced pinnules), 'Rotundatum Cristatum' (rounded pinnules and a tendency to grow in a twisty circle; it also has bulbils on its rachis), 'Divisilobum' (very lacy with tripinnate fronds), 'Divisilobum Polydactylon' (forked pinna tips), 'Plumosum Bevis' (graceful, tall, firm, narrow beauty) and 'Mrs. Carnes' (a dwarf delight) (E).

squarrosum (Himalayan shield fern) –SP- This is a show-stopper fern with fronds that are over two feet long, wintergreen, glossy, with sharply pointed pinnule tips. It is not for small spaces, but is easy to grow (A).

Pteridium

aquilinum (bracken fern) –S- I have our native var. latiusculum with tri-parted leaves that grow to 5 feet and are spaced along fast-growing rhizomes. I let it grow naturally, but pull up any fronds that invade other plantings. It should be contained in the sunny garden where it can get rampant. It is difficult to transplant and should be started from spores (which are now scarce) and transplanted outdoors as sporelings (NA, E).

Thelypteris

decursive-pinnata –W- Plant this light green fern in uniformly moist soil and it rewards you with clumps of narrow, erect, fuzzy, pinnatifid fronds, a strongly winged rachis, and new plants at the ends of short runners (dig for propagation) – a delight! (A).

noveboracensis (New York Fern) –SP- The delicate, strongly tapered fronds belie the aggressive growth of this woodland native. It is great in damp, confined spaces (NA).

palustris (marsh fern) –W- As long as the soil is constantly damp, this bluish-green species will grow in sun or part shade. It is definitely invasive, with wide-ranging rhizomes, so keep it confined (NA).

simulata (Massachusetts fern) –W, SP – A slow grower, this rare marsh fern look-alike has undivided veins at its pinna edges. It must have acidic, swampy conditions or will die out slowly (NA).

Woodsia

intermedia- S, R- a small, 3-6" gem for the moist, sunny rockery. Its fronds are once-pinnate and arching, emerging in early spring (A).

obtusa (blunt-lobed Woodsia) – R, SP- Erect, pale, fuzzy leaves can get 12-16" long in favorable conditions. It makes an excellent rock garden fern (NA).

polystichoides (holly-fern Woodsia) –S, R – Looking a lot like *W. intermedia*, this rock garden natural makes a tight rosette of arching fronds that must have sun despite their delicate look.(A).

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Woodwardia

areolata (netted chain fern) –W, SP- This is a swamp native for a damp woodland garden setting. Its sterile fronds resemble those of *Onoclea*, but its separate, fertile fronds are merely slender, not woody. It has branching rhizomes that spread around, so give it a bit of room to romp (NA).

virginica (Virginia chain fern) – W, S –Black stipes contrast with the dark green blades of the stiffly upright fronds. This chain fern bears spores on the undersides of its fronds and has distinctively chain-linked veins. It comes up in the damp soil around my small pond and tends to migrate out from its original planting site, so give it some room (NA).

Ferns that are difficult, but possible to grow in W. Pa.

Asplenium

montanum (mountain spleenwort) – R, SL – Must be planted on a vertical, granitic or sandstone (acidic) rock wall, with a cool, moist root run, and completely protected from the incessant ravages of snails and slugs. This little charmer is easy to grow from spores, but a real challenge to transplant and maintain in the garden (NA).

Blechnum

niponicum (Japanese deer fern) –M- small gem with prostrate sterile fronds that are bright pink when they emerge in late spring (A).

penna-marina (little hard fern) –M W S- must have an acidic, moist location with several hours of sun daily. A short-creeper that makes a handsome show against rocks, it tends to die out after several years in my garden, but I am slowly getting used to its growth requirements. Its crested form 'Cristatum' has a tighter growth pattern and is a bit more fragile (New Zealand, Australia, Chile).

Camptosorus

rhizophyllus (walking fern) – R, SP, SL – This unusual, tip-of-the-leaf rooting and propagating fern is easy to grow from spores, but its sporelings are ravaged by slugs (although the mature plants are more resistant). I got a colony established by planting sporelings in a shallow layer of compost enriched with pelletized lime sitting on top of a large, flat limestone rock. Sprinkling diatomaceous earth and a good slug control product periodically keeps the slugs at bay (NA).

Cheilanthes

lanosa (hairy lip fern) – R, D, S – This eastern species requires some sun each day and a well-drained, rock setting with reliably moist sub-soil for its root run – difficult to provide in a typical garden. It must also be protected from winter wet and cold. I mulch it heavily, but give the crown air circulation (and I take one plant into the cool greenhouse each fall, just in case!) (NA).

tomentosa (wooly lip fern) – R, D, S – The same conditions required by C. lanosa apply as well to this attractive, blue-green, white-haired, desert beauty (NA).

Pellaea

atropurpurea (purple cliff brake) – R, D, SP – This limestone rock lover is hard to establish, needs shade and tends to die out after several years in my lime cobble. I will keep trying (it is easy to grow from spores) as it is one of my favorites in the wild (NA).

glabella (smooth cliff brake) – R, D, S – Everything said about *P. atropurpurea* applies as well to this sister species except *P. glabella* is more prostrate in growth, more subject to slug attacks when young and requires several hours of sun each day. It is worth trying in a sunny, limy spot, wedged securely between chunks of mortar or porous, dolomitic limestone (NA).

Polypodium

virginianum (Virginia polypody or rockcap fern) – R, D, SP – The taxonomy of this fern is difficult. I may even have *P. appalachianum* or the hybrid between the two (distinguishing characters are extremely technical and all three occur in our area). In any case, the plants are very difficult to establish, requiring shade, a rocky perch that is humus-rich (a compost layer) but nutrient-poor, with excellent drainage and consistent moisture. I have surrounded my plants with lots of moss (including peat moss) and that seems to serve as a reservoir of moisture, without damaging the drainage requirement. Even so, the plants do poorly in some years and have died out at least twice (NA).

Polystichum

X dycei (*P. proliferum* x *P. braunii*) – M – This is a new fern for me, but seems to grow easily and has pretty bipinnate fronds and scaly stipes. It is a sterile

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Rock Garden. Photo by Joan Gottlieb.

Ferns in Pittsburgh Gardens *continued from page 55*

hybrid, but when it produces bulbils at its frond tips (like its *P. proliferum* parent), I hope to be able to propagate it. It will get heavy mulching for the winter (E).

munitum (western sword fern) – (M) – Not at ease with our wet, cold winters, this west coast native survives in my garden in miniature. I mulch it heavily each fall and have it planted at the base of a Metasequoia tree where it has minimal wetness (western NA).

Recommendations from North Central Kentucky, USA continued from page 28

All of the recommended ferns should do well in areas like the lower Ohio Valley. However I learned that much of the fun of gardening is growing plants that are not supposed to flourish, but do so in a special place in the garden. I hope readers will be inspired to try to grow some of the questionable or not recommended ferns just to prove they can do it, and thereby broaden our knowledge of all the places where these ferns will grow.

Rotary Garden *continued from page 35*

Lygodium palmatum
Marsilea quadrifolia
Osmunda japonica
Osmunda regalis 'Purpuraseens'
Parathelypteris japonica
Pellaea atropurpurea
Phegopteris decursive-pinnata
Polypodium australe 'Cambricum Wilharris'
Polypodium glycyrrhiza 'Longicaudatum'
Polystichum makinoi
Polystichum setiferum 'Acutilobum'
Polystichum setiferum 'Angulare'
Polystichum setiferum 'Plumosum Bevis'
Polystichum setiferum 'Plumosum Densum'
Polystichum xiphophyllum
Pteridium aquilinum
Thelypteris palustris
Thelypteris palustris 'Cristata'
Thelypteris phegopteris
Thelypteris tylodes
Woodwardia orientalis var. formosana
Woodwardia virginica

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